EXTRA TECH FOCUS — 32 PAGES OF BREAKTHROUGH TECHNOLOGY

WIN FORD FOCUS WORTH OVER R230 000

TECH » SCIENCE » WHEELS » HOME » OUTSIDE

www.popularmechanics.co.za
mobile.popularmechanics.co.za

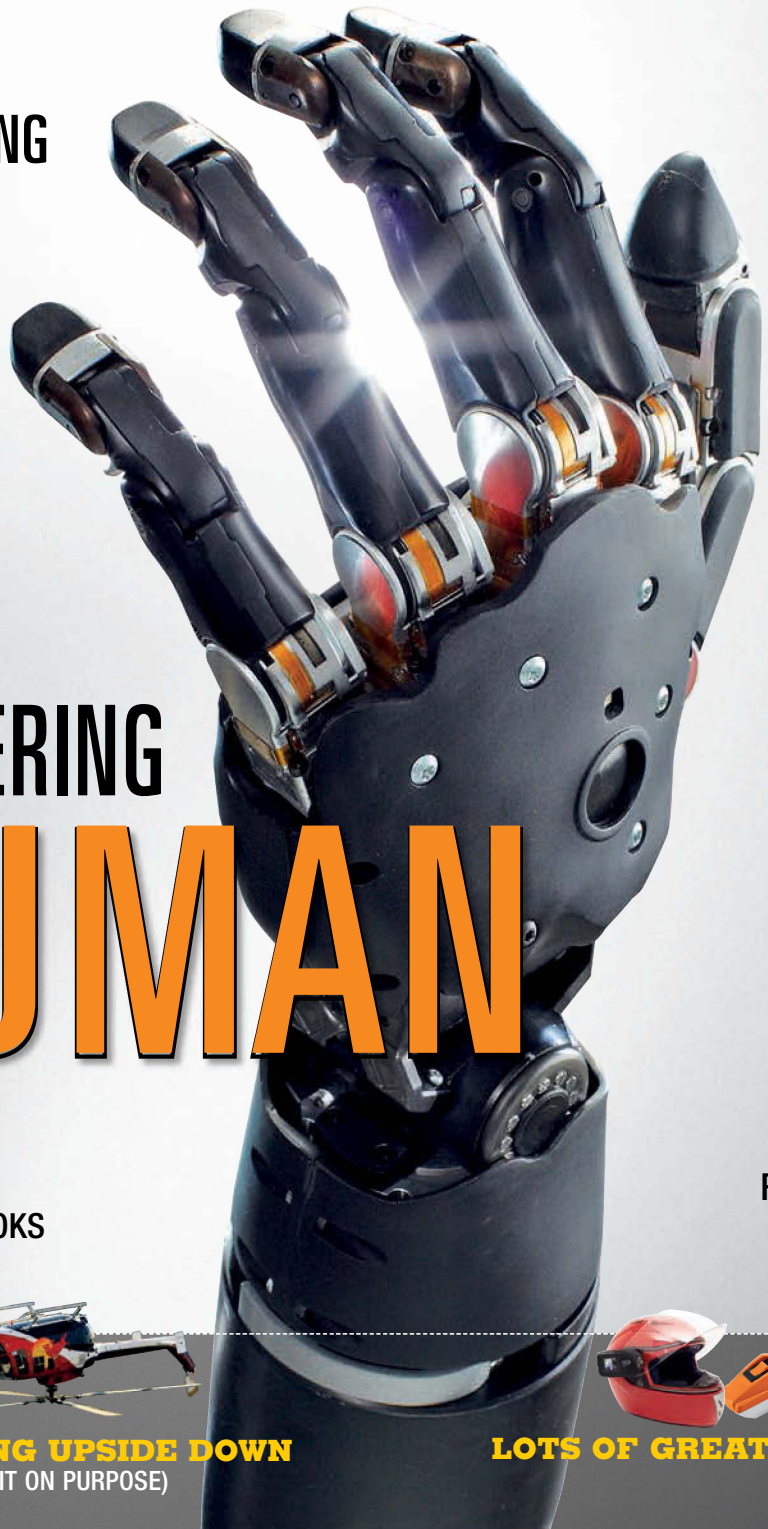
Popular Mechanics

JUNE 2012, **RSA: R29,95**
Other countries: R26,27 excl VAT

WHAT WENT WRONG
ANALYSING THE *COSTA CONCORDIA* TRAGEDY

HOW BIONIC TECH WILL GIVE US LONGER, HEALTHIER LIVES

RE-ENGINEERING THE HUMAN



LAB-GROWN ORGANS
Scientists now produce vital body parts from scratch

SYMBIONIC LEG
Combines a bionic knee, ankle and foot for the first time

PRINTED BONES
3D scaffolds provide structure for new cells

PLUS:
BRAIN CONTROL!
The user's thoughts move this robotic hand

CONNECT SA
- BUSINESS IN THE CLOUD
- BEWARE THE CYBER CROOKS

FACEBOOK
RULES OF ENGAGEMENT

FLYING UPSIDE DOWN
(WE DID IT ON PURPOSE)

LOTS OF GREAT GADGETS

9 771682 513003 06119

JWT60367/E

Some cars get you from A to B. Some do a whole lot more. The new **KUGA** has a 2.5l Duratec turbo engine (147kW, 320Nm), intelligent all-wheel drive, a clever split tailgate and a full suite of life-enhancing technology features. It won't just complement your life, the new **KUGA** will improve it.

New **KUGA**. Upgrade your life.

*Model shown with optional 18" wheels.

Ford

Go Further

www.ford.co.za

UNVEILING OUR TECH FUTURE.

futuretech2012

TOMORROW'S TECHNOLOGY TODAY ● Popular Mechanics *Be the first to know*

Contrary to widespread belief, South Africa does *not* lurk at the bottom end of the technological food chain. In fact, when it comes to connecting with the future through new technologies and exploiting every avenue of communication, our hunger knows no bounds – as does our pride in home-grown innovation.

Now say hello to **FutureTech 2012**, a unique Popular Mechanics initiative that will bring together tech-savvy people from all over South Africa for an exciting and inspiring conference. It happens in Johannesburg on 25 October, and it's destined to be a "must" on the calendar of anyone who wants to get up to speed in a world ruled by technology. The theme of our inaugural conference is "connect", a word that will resonate with anyone who understands the mechanics of the 21st century.

Representing the top echelon of science and technology, our presenters will unpack technologies that are already changing our lives for the better, enabling us to share world-changing ideas and solve challenges together. Programme details and booking information will be available soon; please watch for announcements via our Web site, our weekly e-mail newsletters ("The Cutting Edge") our TV commercials and other channels.

There's also some good news for South Africa's vibrant inventing community: our Inventor of the Year Competition remains as an integral part of the **FutureTech** initiative. Details of the annual challenge, which offers even bigger cash prizes for 2012, will be released within the next few weeks (see elsewhere in this issue).

Now to this month's magazine.

Our cover story, "Re-engineering the human", explores some remarkable breakthroughs in the design of prosthetic limbs, artificial organs, bones and even blood cells. Bionic limbs with machine intelligence can now sense their environment and predict a user's intentions. The prosthetic arm on our cover is actually composed of a swarm of robots, each detachable segment housing a processor that works in concert with the others. Wonderful stuff, and it's bringing new hope to many people.

We hope you enjoy our bumper 32-page **Tech Focus supplement**, which comes free with this month's issue. It introduces fascinating and increasingly relevant technologies in the fields of home entertainment, automotive safety, leisure pursuits, communications, and much more. We provide advice on buying a new TV, introduce a couple of outrageous bicycles, unpack appliances with brains, and ask what it will take for tablets to replace PCs.

As always, we showcase a heady assortment of new gadgets throughout the magazine – which brings me to an opportunity for full disclosure. Having been consumed with guilt for the past few weeks, I should now confess to my wife (who is morally obliged to read PM every month) that the 600 mW laser pointer, Music Angel docking station, multi-bladed camping knife and Samurai steel LED watch were not, in fact, "for the office".

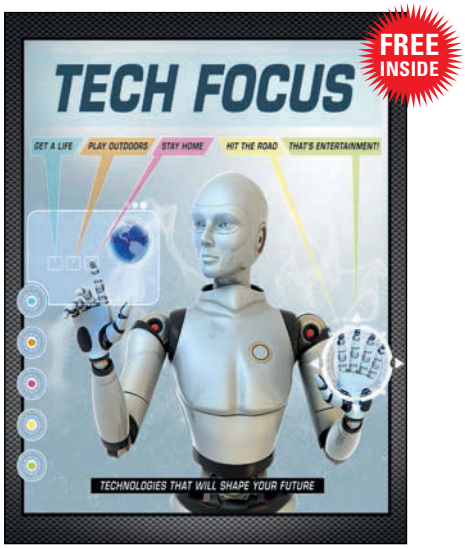
Finally, regular PM readers who may have been alarmed by our "haunted house" headline need not be concerned: it's not about exorcism or exploring beyond the veil. Instead, we explain what makes doors bang and floors creak in your ageing house, then tell how you to fix them. It's what we do.

aland@ramsaymedia.co.za

● *Visit page 28 for details of the online SA magazine survey and tell us what you think of your favourite magazines. Prizes worth R150 000 are up for grabs.*

Page 20

Page 124



COMPETITION WINNERS... Details online at *www.popularmechanics.co.za*

Popular Mechanics
BE THE FIRST TO KNOW

CONTENTS

JUNE 2012 VOLUME 10, NO. 11

TECH

20 **Re-engineering the human** (cover story)
Bionic limbs get smarter; blood cells are next

45 **DIY tech**
Five rules for Internet safety

58 **Digital clinic Q&A**
- Name that sound
- Neg-a-pixels

69 **SA: gadget nation**
Of cyber crooks and cloud storage

74 **My sandbox, my algorithm?**
First, get your head around "smart" sand...

SCIENCE

12 **Tech watch**
- Fire and forget
- The flutter fighter
- Dummy fish, smarter dams
- Fukushima's long goodbye

HOME

121 **Homeowner's clinic Q&A**
- Make your move
- Start digging
- Yankee dandy
- Fan clubbed

124 **Fix your haunted house**
Creaking floors? Flickering lights? Strange smells? Here's what to do about it...

PM DIGITAL

123
- Spot the Ford Focus – and win
- Watch the chilling *Prometheus* trailer
- Win an outdoor kitchen-in-one

OUTSIDE

56 **Flying upside down**
Our journo steps aboard an acrobatic helicopter

IN FOCUS

66 **Hearth and home**
- A radically different fan heater
- Bling's the thing (just add crystals)

WHEELS

48 **New on the block**
- Lambo off-road rocket
- Merc concepts
- Keep Old Faithful running
- Sports car skirmish

114 **Esoteric car repairs**
Welcome to an obsessive underworld

128 **Car clinic Q&A**
- Oil crisis
- Mystery leaks

FEATURES

36 **What went wrong**
PM investigates the deadly *Costa Concordia* accident

60 **Training day**
Preparing first responders for the worst

72 **Facebook faux pas**
Minding your manners in social media

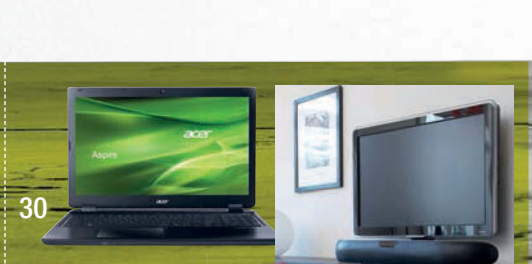
UPGRADE

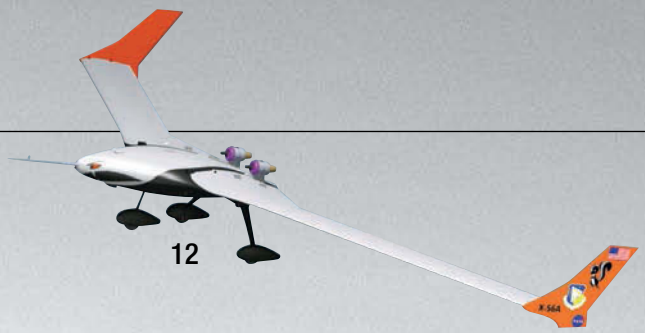
76 **When ideas run free**
- Meet a two-seater hybrid car and gyroplane
- Honda redefines personal mobility
- Thirsty? Fancy a R1,25 million bottle of whisky?

MONTHLY

1 Editor's notes
4 Contact us
7 Letters
10 Time machine
30 Great stuff
113 This is my job
144 Do it your way

On the cover: The Modular Prosthetic Limb, developed at Johns Hopkins University for DARPA, belongs to a new wave of bionic devices with superior dexterity and machine intelligence. A brain-controlled model is in clinical trials now. Photograph by Eric Ogden. This page: Designed and built by Ekso Bionics, this exoskeleton was the first to step out of the lab and into the real world.





12

WIN

A desirable Ford Focus worth over R230 000 (see page 42)

TECH FOCUS

Embrace the 21st century!

This month's bumper issue of PM incorporates the inaugural 32-page Tech Focus supplement, your guide to the most exciting products and developments in the fields of home entertainment, automotive tech, communications, leisure activities, and more. It starts on page 81.

48

76

66

20

NEW PPR 250 electric paint roller. Designed for consistent, virtually drip-free painting of large smooth and rough surfaces such as walls and ceilings. The "Paint Control" Technology and remote control ensures the tool only feeds the required amount of paint, as the paint is fed directly from the bucket. Complete with 40cm long hand piece, 80cm extension arm and 5m long hose, making painting easy for any do-it-yourselfer. **You'll be amazed.**

BOSCH
Invented for life

www.bosch-pt.com/za/en

Popular Mechanics

BE THE FIRST TO KNOW

EDITOR: Alan Duggan **PUBLISHER:** Neil Piper

EDITORIAL TEAM

DEPUTY EDITOR	Anthony Doman
ASSOCIATE EDITOR	Sean Woods
DIGITAL CONTENT MANAGER	Kate Downs

PRODUCTION AND CREATIVE TEAM

PRODUCTION MANAGER	Helen van Beuge
PRODUCTION (Supplements)	Judy Romon
ART DIRECTOR	Thea Woodman
DESIGNER	Sharon Gunst
BUYER'S GUIDE DESIGNER	Relic Wessels
DIGITAL DESIGNER	Lars Liedberg
WEBMASTER	Nikky Oosthuizen

BUSINESS AND SALES TEAM

MARKETING MANAGER	Dean Dicks
DIGITAL BUSINESS MANAGER	Wendy Lucas
NATIONAL SALES MANAGER	Andre Stadler
SALES MANAGER	Lea van Coller – Tech Jenny Kaplan – Auto
MARKETING SERVICES MANAGER	Andrew Stodel
MARKETING SERVICES ANALYST	Benita Bollers
PROMOTIONS MANAGER	Nomfundo Calana
ADVERTISING SALES EXECUTIVES	Brett Soutter, Joanne Thompson, Patrick Kennedy, Lindi van den Heever, Peter Botha, Nicky Lloyd – Sandton Christian von Dürckheim – Cape Town
ADVERTISING SALES ASSISTANT	Linda Delport
DIGITAL TRAFFICKER	Nawhaal Fakir

ramsaymedia

CIRCULATION MARKETING

CIRCULATION MANAGER	Ian Dinan
SUBSCRIPTIONS MANAGER	Catriona Bennie
SUBSCRIPTIONS ADMINISTRATION	Lynn Heiberg
SUBSCRIPTIONS MARKETING	Sandy Immelman
CONTACT CENTRE MANAGER	Werner Debba

GROUP SUPPORT

SALES DIRECTOR	Simon Turck
CREATIVE DIRECTOR	Brandon de Kock
CHIEF FINANCIAL OFFICER	Werner Schmidt
DIGITAL PUBLISHING	Andrew Solomon
PR & COMMUNICATIONS	Shelly van Zyl
ICT MANAGER	Alex Chetty

PUBLISHED BY RamsayMedia (PTY) LTD
Company registration number: 1934/005460/07 ISSN number: 1682-5136

CHAIRMAN Alan T Ramsay
MD Stuart Lowe
DIRECTORS Terry Moolman, Gordon Utian, Brian Burnett, James Eedes, Simon Turck, Tim Holden, Peter Venn

Cape Town head office: Uitvlugt, 3 Howard Drive, Pinelands, 7405
P O Box 180, Howard Place, Western Cape, 7450
Tel: 021 530-3100, Fax: 021 530-9495
Sandton office: 17th Floor, Office Tower, Sandton City, Sandton, 2196
P O Box 78132, Sandton, Gauteng, 2146
Tel: 011 783-7030, Fax: 011 783-0451
E-mail address: *popularmechanics@ramsaymedia.co.za*
www.ramsaymedia.co.za

HOW TO SUBSCRIBE OR CONTACT US

Call: 0860 100 205, **Fax:** 0866 704 101 or 021 530 3143,
E-mail: *subs@ramsaymedia.co.za*
Online: *www.magsathome.co.za* or *www.popularmechanics.co.za*
Web site: *www.popularmechanics.co.za*
FOR OUR CURRENT SUBSCRIPTION RATES, SEE PAGE 42

Published and distributed by RamsayMedia (Pty) Ltd by permission of Hearst Communications Inc, New York, New York, United States of America.

We cannot be responsible for loss of unsolicited queries, manuscripts or photos. For return, they must be accompanied by adequate postage. As a service to readers, Popular Mechanics publishes newsworthy products, techniques and scientific and technological developments. Due to possible variance in the quality and condition of materials and workmanship, Popular Mechanics cannot assume responsibility for proper application of techniques or proper and safe functioning of manufactured products or reader-built projects resulting from information published in this magazine.

Total monthly sales: 45 577 (October to December 2011)

HOW ALIVE ARE YOU?

JAGUAR

Alfred Dunhill Ltd

CUSTOM

A perfectly tailored new fragrance

Monogram your bottle cap at dunhill.com

dunhill

LONDON

Winning letter

LET'S BRING THEM BACK

I was interested to see the poll results in your issue of March 2012 indicating that 25 per cent of your readers believe scientists should not resurrect the woolly mammoth because they "went extinct 10 000 years ago for a reason", and because "it is not up to us to play creator".

What these readers have not taken into account is research, published in the same month, indicating that woolly mammoths would probably not have been extinct in the first place were it not for people. Our forebears played as much a role in the end of that species as Nature.

Graham Prescott and David Williams, zoologists from the University of Cambridge, developed a model to calculate how climate change and the arrival of humans respectively correlated to the disappearance of species of megafauna. They found it very likely that Stone Age hunters had a hand in at least some of these extinctions.

Not only the woolly mammoth seems to have been our victim, but possibly also giant kangaroos and some big flightless birds. The findings, published in *Proceedings of the National Academy of Sciences*, are a poignant reminder of how destructive our species has been since its early days. If we can undo some of that harm, why not?

JOHANNES BERTUS DE VILLIERS
JOHANNESBURG

Write to us, engage us in debate, and you could win a cool prize; this month's best letter wins a desirable CAT watch worth R1 995. CAT Timekeeping Equipment reinvents and contextualises the heritage and authenticity of the brand's core know-how – clean and urban, encased in finely engineered stainless steel, and equipped with a technically advanced movement. For more information, contact S Bacher & Co on 011-372 6000 or visit www.sbacher.co.za

Send your letter to: Popular Mechanics, PO Box 180, Howard Place 7450 or e-mail *popularmechanics@ramsaymedia.co.za* Please keep it short and to the point. Regrettably, prizes can be awarded only to South African residents.

X PRIZE FOUNDATION

Think big, people

It's time for a big South African company to reach into its deep pockets (call it a marketing strategy, if you like) and pull out a plan to galvanise our country's legions of inventors and innovators. Popular Mechanics has laid some wonderful groundwork with its Inventors Conferences and competitions, but now it's the turn of the Big Players.

My advice: take your cue from the X Prize Foundation (*www.xprize.org*). These guys have big ideas, and set serious challenges – and it works. A few months ago, they launched the Tricorder X Prize, sponsored by Qualcomm – an R80 million bonanza to be awarded for creating a mobile device that can "diagnose patients better than or equal to a panel of board certified physicians". They have also partnered with the Bill & Melinda Gates Foundation to develop a prize for a better tuberculosis diagnostic tool.

Getting the idea? We need a R10 million prize for someone who develops a basic but durable house costing no more than R1 000, or a device that halves infant mortality in impoverished areas, or a foolproof detector of political venality. Who's doing the brainstorming?

CRAIG ABBOTT
OBSERVATORY

Editor's note: Excellent idea. In the meantime, we're about to release details of our second annual Inventors Competition, which carries even bigger cash prizes this year, and we're working on an exciting conference that promises to light a fire among "connected" South Africans.

Timeless hints dept

As you point out in "Editor's notes", it's amazing how many of the tips from old issues of PM still hold good today ("100 years of top tips", April issue). For example, my wife still uses half a potato to moisten the adhesive on envelopes that we mail to our clients (if you haven't licked an envelope for a while, believe me when I say the taste is awful). Another hint that sounded familiar was the one about adding sand to floor paint to create a non-slip surface. Since an elderly relative slipped and fell on our wet front porch last winter, we've coated all potentially hazardous floors with non-slip paint. It works beautifully.

TONY HARRIS
DURBAN

Questions, questions

Your article on Waldo Stakes and his Sonic Wind car ("The 3 000 km/h obsession", January issue) refers. Here are some aspects that bother me:

- Wing Commander Andy Green was in South Africa late last year on a lecture tour; Thrust SSC smashed the sound barrier in 1997; Bloodhound (another potential record-breaker) is to go beyond that.
- A wind tunnel cannot be used for testing the model of a supersonic car as there is no "ground effect".
- Where does the money come from? Waldo "moonlights as a rocket scientist" but he has no qualifications. Who employs him?
- Where is the planned test ground? Bloodhound will come to Hakskeen Pan in the Northern Cape. The track will be 20 km long – for 1 600 km/h. How long for 3 000 km/h?
- Is it so wrong to chase a dream beyond one's grasp? Maybe not, but, in this case, it may prove to be fatally foolish. Are there no restraints in the US regarding people wanting to exit this world in a spectacular fashion?

But I marvel at all this. As a young lad, back in the Fifties, I was fascinated by speed and the sound barrier. I sketched my hero, Sir Malcolm Campbell, and imagined him breaking the sound barrier in Bluebird. I have also lived to see some of the science fiction of Dan Dare (Eagle comics) become reality. Good luck, Waldo!

ALAN CAMPBELL
GARDENS

World's biggest parachute?

A Tech Watch article in your March issue ("Mars, here we come – again") refers. You discuss "a parachute 100 metres in diameter". This makes no sense; a 100 m -diameter parachute would almost cover Loftus stadium!

GRÄBE DE VILLIERS
RANDBURG

Editor's note: We have no idea where our figure came from; it's really weird. Anyway, the parachute's real diameter is 165 feet, or about 50 metres. Thanks for taking the trouble to write.

Solar heating: back to basics

South Africa tends to go for big technology, but there are other countries, such as Kenya, that have to settle for different options. At Tiwi, the solar heating strategy was to pass the water though matt black-painted galvanised pipes inside a box, the surface of which was a large pane of window glass. The box was placed where it wouldn't be smashed by falling mangoes or coconuts. Of course, the pipes don't last as long as copper, but at least they are cheap to replace. I'm sure this approach is not exclusive to Kenya, but I am unable to find anyone over here who has even thought of it.

STEPHEN CRIDLAND
RONDEBOSCH

Editor's note: you'd be surprised.

Keep it coming, PM

I have been a proud and avid reader for the past 10 years. My first introduction to your magazine came from my dad at age six. Now, 10 years down the line, I would like to say thank you for a great publication! Popular Mechanics has been an inspiration for me at school and at home, and many school projects were inspired by timely articles over the years. I can't wait for the next issue.

BENJAMIN WYBENGA
BLOEMFONTEIN

You're welcome, dude

I cannot begin to tell you how much I enjoyed the April issue of Popular Mechanics, having been an avid fan ever since seeing it for the first time on a railway station bookshelf when I was 11 years old, way back in 1943. Memories came flooding back of the many innovative ideas found in PM in years gone by. Thank you for reawakening those memories.

I especially enjoy the projects that are once again appearing for the do-it-yourself readers. Thanks for the wonderful work you and your staff do in bringing us our own South African Popular Mechanics.

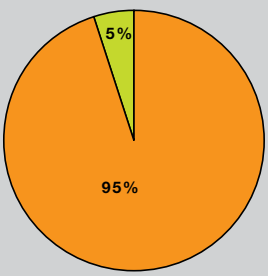
P.S. I am the "dude" who designed and built the workbench that you featured in the third issue of your magazine (October 2002).

CARL MOUTON
VIA E-MAIL PM

MONTHLY POLL

Should we be pouring more money into acquiring broadband in South Africa?

- *Yes, of course. It's a connected world.* ***95%***
- *No. It's a waste of money. There are far more important national priorities e.g. education and land.* ***5%***



Conducted online at *www.popularmechanics.co.za* – visit PM's Web site to vote in our current poll.

BRIDGESTONE
Your Journey, Our Passion

Enjoy the New Limit

POTENZA

The POTENZA range represents the pinnacle of Bridgestone's dedication to motoring perfection. Proven in Formula 1™, the POTENZA range gives you the power and control to push your high-performance vehicle to the limit.

For the ultimate in safety, performance and sheer driving pleasure, satisfaction has but one name: POTENZA.

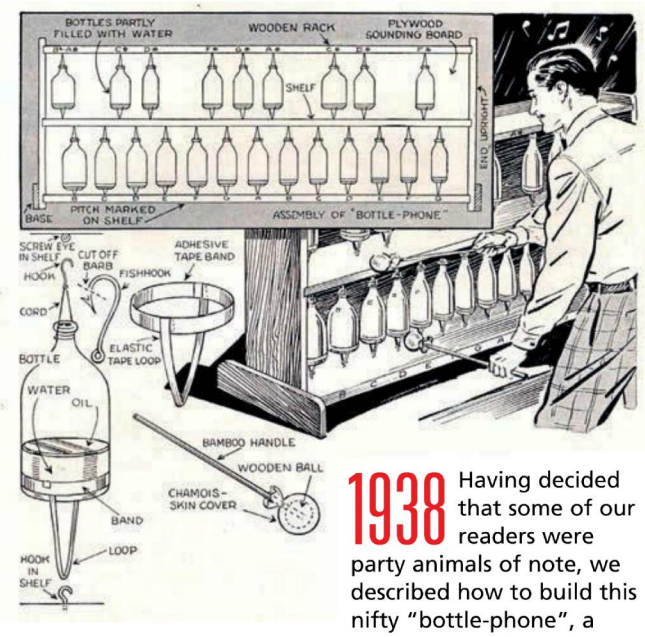
S001

Adrenalin

Bridgestone South Africa
For your nearest Bridgestone Authorised Dealer, visit our website:

www.bridgestone.co.za

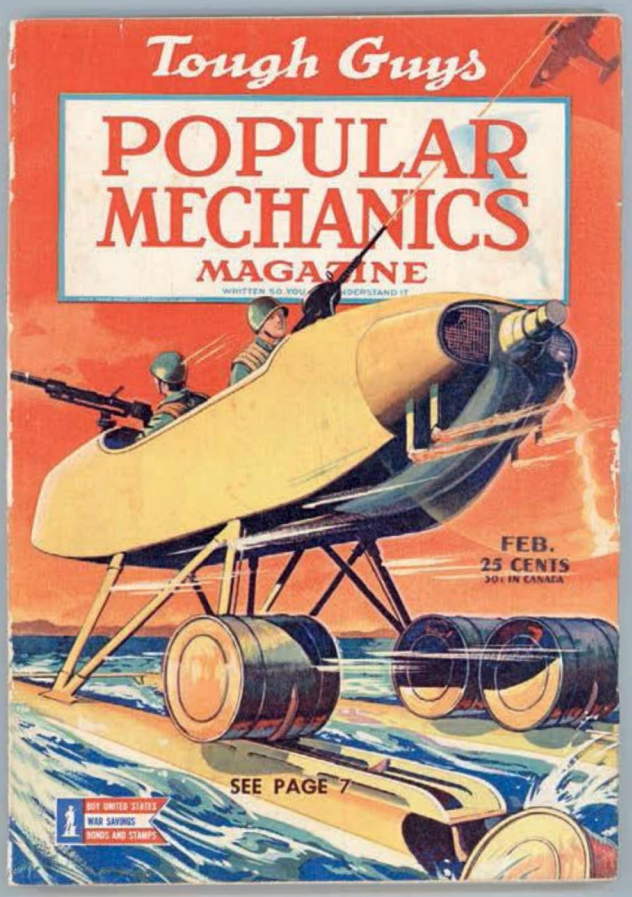
DWT: BS/514821



1938 Having decided that some of our readers were party animals of note, we described how to build this nifty "bottle-phone", a musical instrument employing 22 water-filled bottles "tuned" to a range of notes from B-flat below middle C to G above high C (it was to be tuned with the help of a pitch-pipe and a piano). Any comment here would be entirely superfluous.

1928

Our advertisers have always cared about the health of PM's readers. Witness this opportunity to purchase a pain-fighting invention employing the four greatest curative powers known to man – violet rays, ozone, vibration and medical electricity. Grateful customers reportedly praised the Elco Health Generator for curing their colds, eczema, insomnia and constipation.



1943 Although this month's cover featured a heavily armed "sea skimmer" designed to fight submarines, the lead article actually focused on what we termed "the deadliest fighter the world has ever known" – the American soldier, sailor or marine trained for invasion "against a foe that fights dirty" (the United States had been at war with Japan for 14 months). The accompanying illustrations provided some disconcertingly brutal lessons in hand-to-hand combat, including "death blows".

1960 If you know anything about cars, you've probably heard about the Chevrolet Corvair, with its rear-mounted, air-cooled engine and rather chequered reputation (consumer advocate Ralph Nader was so rude about it in his 1965 book, *Unsafe At Any Speed,* that Corvair sales plummeted). Interestingly, many people loved the car, and it was widely referred to as "the poor man's Porsche". What you may *not* know is that the model line-up featured several commercial vehicles, including this Rampside pickup. **PM**

IRELAND/DAVENPORT 69624/R

BMW 3 Series

www.bmw.co.za/320i

Sheer
Driving Pleasure

THE NEW BMW 320i.
THE POWER TO TAKE OFF IN AN INSTANT.

The new BMW TwinPower Turbo engine delivers power you can feel in an instant. Built to combine performance with efficiency, this innovative 2.0 litre, four-cylinder engine produces an impressive 135kWs of power and consumes just 6.1 litres of fuel per 100km. Supported by intelligent engine technologies designed to maximise performance, it comes as no surprise that the BMW TwinPower Turbo engine's CO_2 emissions are only 144g/km and it accelerates from 0 to 100 km/h in just 7.3 seconds. **For more information go to www.bmw.co.za/320i**

THE NEW BMW 3 SERIES.
THE MEASURE OF PERFORMANCE.

BMW EfficientDynamics

320i	6.1l/100 km	135 kW

SA RUGBY

BMW. Official vehicle partner to the Springboks.

The new BMW 3 Series is available in 320i, 328i, 335i and 320d. BMW 3 Series Sport Line shown.

The 10 cm-long bullet has tiny fins, like those of a dart, that are controlled during flight by electromagnetic actuators that adjust its trajectory up to 30 times per second.

> To find out more and to view footage of the Sandia-developed self-guided bullet, visit PM's Web site at www.popularmechanics.co.za

▪ MODERN WEAPONRY

Fire and forget

A self-guided bullet developed by Sandia National Laboratories is the first small-calibre ordnance to change its flight to strike a target. The key: an optical sensor in its tip that zeroes in on a laser beam indicating its destination. With a standard charge, the bullet can travel at twice the speed of sound and hit targets more than 1,6 km away. Engineers attached a tiny LED to the bullet (shown in flight, above) to prove that the battery and electronics can survive the high-speed flight. – ALEX HUTCHINSON

Prehistoric snack

Ancient remains discovered on the Peruvian coast show that our ancestors were eating popcorn 2 000 years earlier than previously thought. Husks and stalks dating as far back as 6 700 years indicate that people cooked and ate corn in a variety of ways, including popping kernels over a fire.

Corn was first domesticated about 9 000 years ago in Mexico from a wild grass called teosinte, and was often used to make flour. However, the archaeological evidence suggests that the ancient Peruvians ate popcorn like we do – as an occasional snack rather than a dietary staple.

The X-56A (shown here in an artist's rendition) is designed by Lockheed Martin's Skunk Works division.

AN UNMANNED X-PLANE WILL TEST THE BOUNDARIES OF SHAPE-SHIFTING WINGS THAT COUNTER A POTENTIALLY DEADLY AERODYNAMIC FORCE.

BY STEVE ROUSSEAU

The flutter fighter

The Pentagon's newest experimental military aircraft isn't designed to evade radar or drop bombs; it's an unmanned science platform that could make high-altitude, long-endurance air travel safer. Air Force Research Laboratory (AFRL) engineers will use the X-56A to look at an aerodynamic phenomenon known as flutter – dangerous vibrations in an aircraft's wings.

To counter flutter, engineers typically thicken structural reinforcements such as spars and ribs. But this increases weight, which in turn eats up fuel. "We have a better approach," says AFRL project manager Pete Flick. Instead of stiffer wings, the X-56A will test active flutter control, a system of sensors and flaps that detect and deflect increasing aerodynamic loads. Aircraft with active flutter control will be much lighter and so could potentially fly faster and more efficiently, Flick says.

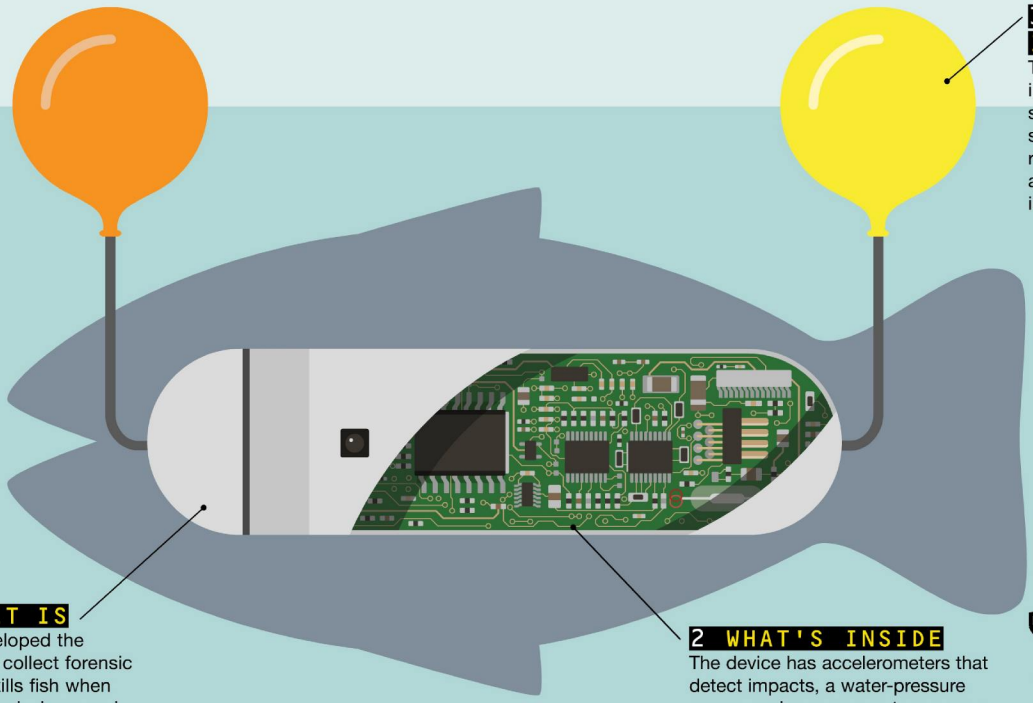
UNDERSTANDING FLUTTER

Wing flutter is a phenomenon similar to what makes a flag flap. Vibrations caused by air passing over the wing can cause it to wobble or even snap in a matter of seconds. At a certain airspeed, at a certain altitude, the wings of any aircraft may start to become unstable. These limitations are part of what test pilots use to define an aircraft's flight envelope – the conditions to which pilots must adhere to operate an aircraft safely.

FLIGHT-TEST STRATEGY

Flutter is more severe at lower altitudes because the air is more dense. Therefore, X-56A researchers will conduct flight tests at higher altitudes to ensure the aircraft can adapt to the conditions before flying closer to the ground.

Photo illustration by US Air Force; illustration by Dogo (prehistoric snack)



3 HOW DATA IS RECOVERED
Time-delay balloons inflate, bringing the sensor bobbing to the surface. Researchers recover the device and download the information.

1 WHAT IT IS
Scientists developed the Sensor Fish to collect forensic data on what kills fish when they pass through dams and other aquatic infrastructure.

2 WHAT'S INSIDE
The device has accelerometers that detect impacts, a water-pressure gauge, and gyroscopes to measure the spin of fish caught in turbine wash.

The Alden Turbine contains design features inspired by Sensor Fish data. Its corkscrew shape minimises the sudden pressure gradients fish experience. Because the turbine fits more snugly in its channel, its inventors say the efficiency of a full-scale turbine would be about 94 per cent.

▪ ENVIRONMENT SCIENCE

Dummy fish, smarter dams

RECOVERABLE SENSORS SOLVE THE MYSTERY OF WHAT KILLS FISH TRAVELLING THROUGH MAN-MADE RIVER OBSTACLES. *BY DAVID FERRIS*

Every spring in the Pacific Northwest, tens of millions of smolt (young salmon) swim through the Columbia River's hydroelectric dams on their way to the ocean, and every year as many as 10 per cent emerge wounded or dead. The exact cause of the damage was a long-standing mystery.

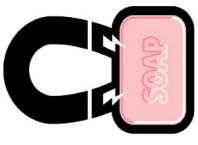
So Tom Carlson, a senior scientist at Pacific Northwest National Laboratory, invented a device that could pass through the dams while recording data: the Sensor Fish. After hundreds of tests, Carlson has the answer. As a salmon wriggles through the turbine blades, it suffers an abrupt drop in pressure. Its swim bladder suddenly expands or bursts, damaging other internal organs. The pressure change can also create air bubbles in the fish's blood, causing a piscine version of divers' bends.

While Carlson covered the Sensor Fish in a polycarbonate plastic shell, Paul Heisey, a fisheries scientist with Normandeau Associates, attached the device's sensors to live fish for a more complete picture. "The condition of the recaptured fish, along with the hydraulic conditions obtained by the Sensor Fish, provide information on the type, severity and cause of injuries," Heisey says. Using that data, he plans to propose modifications to power stations and spillways to make passage through them more benign for fish.

Carlson's team, meanwhile, is adapting the sensor – that is, shrinking it to a 2,5 cm sphere – to create surrogates for many types of fish encountering various infrastructures.

▪ QUICK HITS

> Visit *www.popularmechanics.co.za* to watch a video showing how the magnetic soap works.



Attractive solution

Scientists have developed a new tool that could make oil spills a little easier to clean up: magnetic soap. Chemists at the University of Bristol in England added iron atoms to a conventional surfactant made of chloride and bromide ions. Analysis using a high-energy neutron beam showed that the iron atoms clump together into clusters large enough to respond to a magnetic field, enabling the soap to be removed after it's deployed to break up a spill. In addition, an external magnetic field could control properties such as melting point, clumping size and water solubility to make the soap fit the needs of different industrial applications.

Illustrations by Joe Oliver (sensor fish), DOGO (turbine) and Attractive Solution)

▪ EMERGENCY RESPONSE

Bark-activated bots

A highly trained dog's dexterity and keen sense of smell make it an excellent resource for rescuing people from areas strewn with debris; on the other hand, a sensor-studded robot can squeeze into tight spots and withstand toxic environments.

Researchers at Ryerson University in Toronto have developed a system that takes advantage of both: a rescue robot that rides in a pouch attached to a dog. The pooch gets as close as possible to a trapped victim, then barks to deploy the robot. During recent tests at Texas A&M University, researchers demonstrated the Canine Assisted Robot Deployment system using a German shepherd named Freitag and a snake-like rescue robot developed at Carnegie Mellon (below).

– ALEX HUTCHINSON

Snake-like robots can be fitted with infrared cameras and other sensors to find trapped people at disaster sites.

> Visit *www.popularmechanics.co.za* to watch a video demonstrating the Canine Assisted Robot Deployment system and the snake-like Drop and Explore (DEX) rescue robot.

▪ EXPLORING EARTH

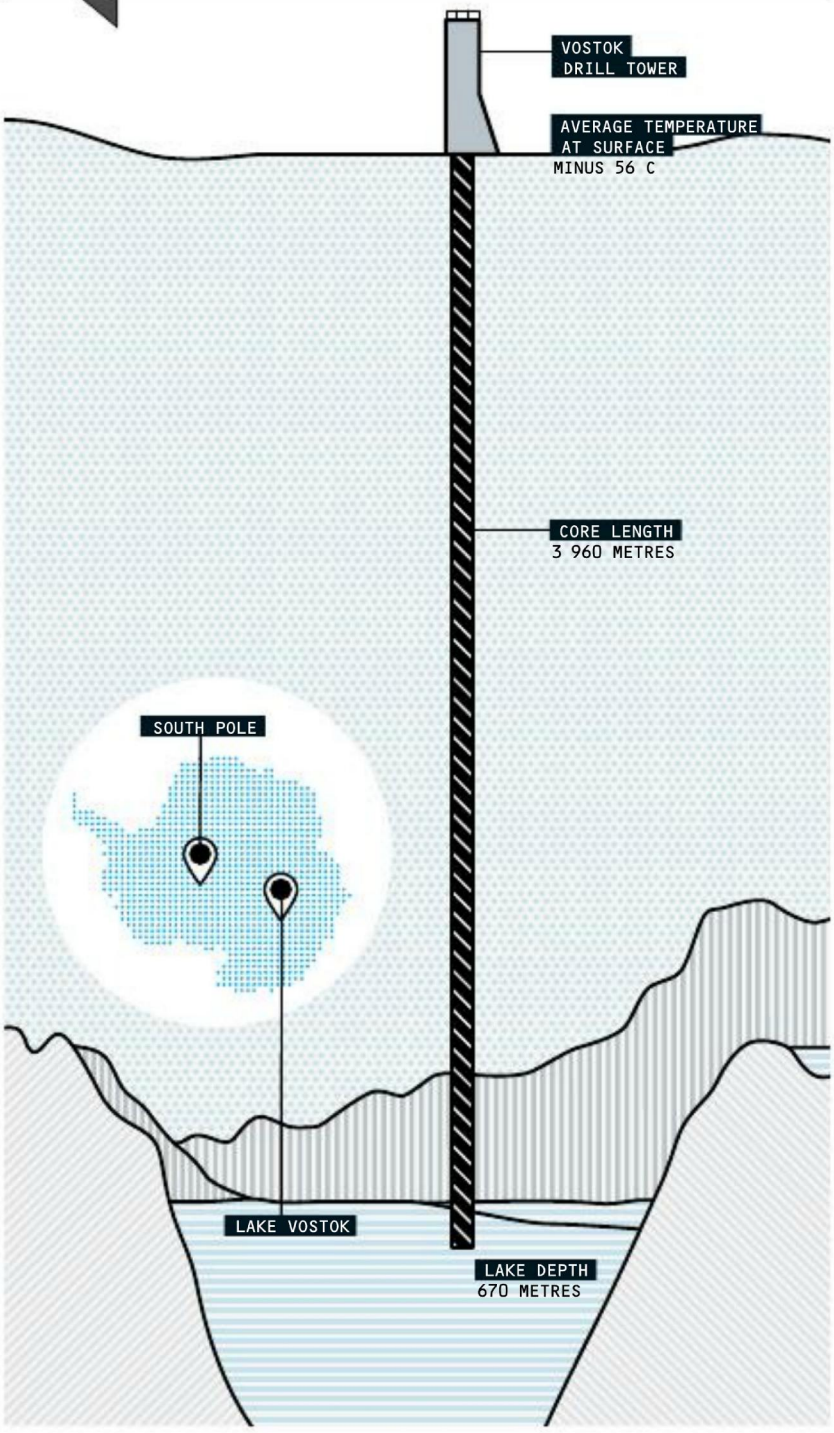


Illustration by Mercè Iglesias

Polar plunge

After a decade of continuous drilling through kilometres of ice, scientists with Russia's Arctic and Antarctic Research Institute have finally reached Lake Vostok. One of Antarctica's roughly 280 sub-glacial lakes, Vostok has not been exposed to the atmosphere in 15 to 34 million years. The scientists will return to the site next year to retrieve the frozen core of lake water that now plugs their borehole. If the water contains organisms, it means life might also exist on the icy moons of Jupiter and Saturn.

DISASTER'S AFTERMATH

Fukushima's long goodbye

Last March, a tsunami damaged the cooling systems of three reactors at the Fukushima Daiichi nuclear plant, causing the leak of high levels of radiation. The Japanese government and plant owner Tokyo Electric Power Company recently released their clean-up plan: a 40-year process of isolating the facility, draining fouled water and dismantling the buildings. – *BY MARINA KOREN*

2012 Engineers install equipment that removes radioactive atoms migrating into underground water and seawater. The land must be repeatedly mapped for contamination because rain distributes the material unevenly in the soil. "It's not a uniform distribution," says Norman Kleiman, an environmental health sciences researcher at Columbia University's Mailman School of Public Health in New York. "We have potential hotspots of contamination here and there." Irradiated soil is removed and stored in secure silos.

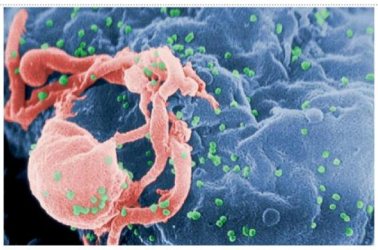
2014 Workers begin to remove debris using remote-control robots. Contractor Takenaka Construction has already purchased demolition robots to tear down irradiated buildings. The company extended the 1 950 kg robots' range, added a video camera, and hardened them against contamination. "High fields of gamma radiation can cause plastics and electronic chips to degrade," says Lake Barrett, who supervised the clean-up at Three Mile Island for the US Nuclear Regulatory Commission.

2015 Workers use newly invented chemical sealants to plug holes in areas of the plant flooded with radioactive water. They drain the water from the reactor building and employ custom-made underwater robots to collect debris from inside the spent-fuel pools.

2016 A cover for the reactor building is installed to enclose the space. Additional video cameras monitor teleoperated work inside the reactor and turbine buildings, which are drained and repaired.

2022 Removal of the fuel rods from the damaged reactors begins. The rods have melted and fallen apart, complicating the clean-up.

2030 and beyond The last of the fuel is removed from the reactor buildings. Demolition crews then dismantle the entire facility, a process that takes decades.



Engineered stem cells track and kill HIV

Expanding on previous research providing proof-of-principle that human stem cells can be genetically engineered into HIV-fighting cells, a team of UCLA researchers has now demonstrated that these cells can actually attack HIV-infected cells in a living organism.

The study, published in the journal *PLoS Pathogens*, demonstrates for the first time that engineering stem cells to form immune cells that target HIV is effective in suppressing the virus in living tissues in an animal model, says lead investigator Scott Kitchen, an assistant professor of medicine in the division of haematology and oncology at the David Geffen School of Medicine at UCLA.

The scientists took CD8 cytotoxic T lymphocytes – the so-called "killer" T cells that help fight infection – from an HIV-infected individual and identified the molecule known as the T cell receptor, which guides the T cell in recognising and killing HIV-infected cells. However, these T cells, while able to destroy HIV-infected cells, do not exist in great enough quantities to clear the virus from the body. So the researchers cloned the receptor and used this to genetically engineer human blood stem cells.

They then placed the engineered stem cells into human thymus tissue that had been implanted in mice, allowing them to study the reaction in a living organism. The engineered stem cells developed into a large population of mature, multi-functional HIV-specific CD8 cells that could specifically target cells containing HIV proteins. The researchers also discovered that HIV-specific T cell receptors had to be matched to an individual in much the same way that an organ is matched to a transplant patient.

Source: University of California

OGILVY CAPE TOWN 49606/SMALL BUS © WSA

Makes for the most beneficial partnership you'll ever have.

The Volkswagen Amarok Single Cab is here. Its class-beating load bay dimensions allow for two Euro pallets to be loaded crosswise, a ground-breaking feature for this segment. It also offers 400Nm of torque with a surprisingly low fuel consumption of just 7.9ℓ/100km*. That's exceptional fuel efficiency for a vehicle that can ease its way up and down a 100% incline, fully laden. For a business on the way to the top, your fleet should be the last thing on your mind. The Amarok Single Cab ensures that whatever your craft, your precious load gets to its destination on time, every time. Visit your nearest Volkswagen Dealer to enquire about the single cab that works twice as hard.

Work hard. Work smart. Amarok Single Cab.

AMAROK SINGLE CAB

Commercial Vehicles

* Fuel consumption figures of 7.9ℓ/100km drawn from combined urban and extra urban cycles. Amarok Single Cab available in: 2.0 TSI 118kW Trendline, 2.0 TDI 90kW Basic, 2.0 TDI 90kW Trendline, 2.0 TDI 90kW Basic 4Motion®, 2.0 TDI 90kW Trendline 4Motion®, 2.0 BiTDI® 120kW Trendline and 2.0 BiTDI® 120kW Trendline 4Motion®. The fuel consumption values are determined using the prescribed methods of measurement (EC Regulation 80/1268/EEC).

▪ NATURAL WONDERS

Methuselah of plants

Scientists are discovering just how much longer cloned organisms can live, compared with those that breed sexually. The original genotype of *Posidonia oceanica*, a sea grass native to the Mediterranean, has been found to be tens of thousands of years old – possibly up to 200 000. Not surprisingly, it's also one of the slowest-growing plants in existence. – *JOE PAPPALARDO*

What's old is news

Scientists in Namibia discovered fossils of a microscopic sponge inside a 760 million-year-old rock, making *Otavia antiqua* the earliest known animal on the planet.

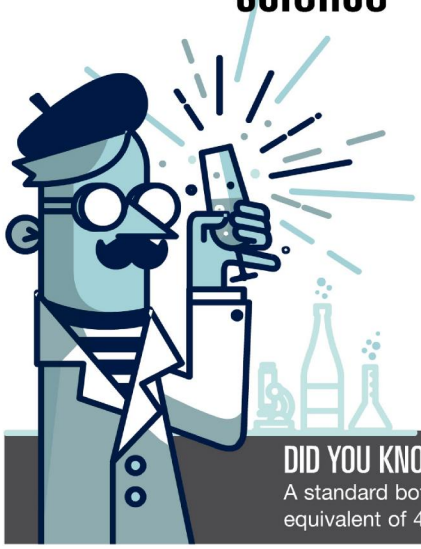
Russian researchers grew frozen *Silene stenophylla* tissue that was buried by squirrels about 30 000 years ago. The ice-age plant is the oldest ever to be regenerated.

A woman was recently arrested for burning down the Senator, a 3 500-year-old cypress tree in Florida, USA. The bright side: scientists transplanted seven cloned shoots that are now growing.

Getty Images (Senator tree)

• EVERYDAY CHEMISTRY

Champagne science



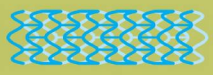
Should you drink champagne from a tall, narrow flute or a shallow, wide glass? To investigate, French scientists (who else?) used microgas chromatography and infrared imaging to measure the levels of carbon dioxide that bubble above the glasses after pouring. The tests confirmed what expert tasters have long reported: more CO_2 accumulates above the narrow opening of the flute, creating a sharper champagne smell. – *ALEX HUTCHINSON*

DID YOU KNOW?

A standard bottle of champagne contains the equivalent of 4,9 litres of dissolved CO_2 gas.

QH ▪ QUICK HITS

The Incredible Disappearing Stent



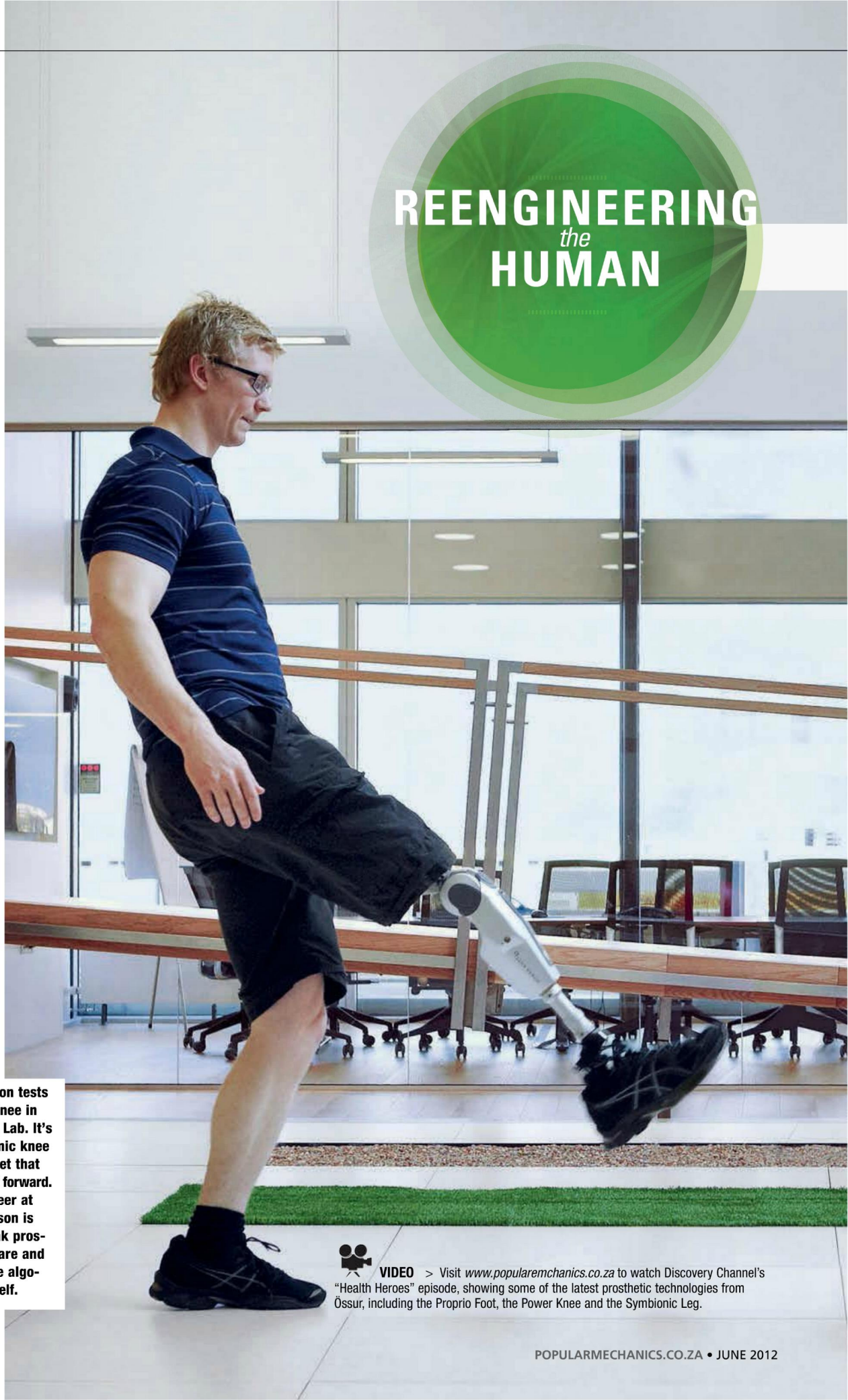
A woman hospitalised in Montreal, Canada, with a severe lesion in a coronary artery became the first patient in North America to be treated with a "bioresorbable vascular scaffold". The device functions like other metal stents that prop open a partly blocked artery while delivering an anti-inflammatory drug to help restore blood flow. The difference: the bioresorbable stent is made of polylactide, the material used in stitches that dissolve. After about two years, the stent will have been fully metabolised and absorbed into the body. That means the healed artery may be able to fully return to normal function, flexing and dilating as blood pulses through. Made by Abbott Vascular, the bioresorbable stent is currently undergoing a 1 000-patient global trial. **PM**

Illustration by Richard Perez

NEW
Unilever
BECAUSE DADS NEED EXTRA CARE TOO...
VICTOR MATFIELD WITH HIS DAUGHTER, JAMIE.
Dove
MEN +CARE
EXTRA FRESH
INVIGORATING FORMULA
1/4 MOISTURIZING CREAM
BODY AND FACE BAR
MEN+CARE
SKIN CARE BUILT IN
www.facebook.com/dovemencaresa
VERVE DOVEMSC03363003

REENGINEERING *the* HUMAN

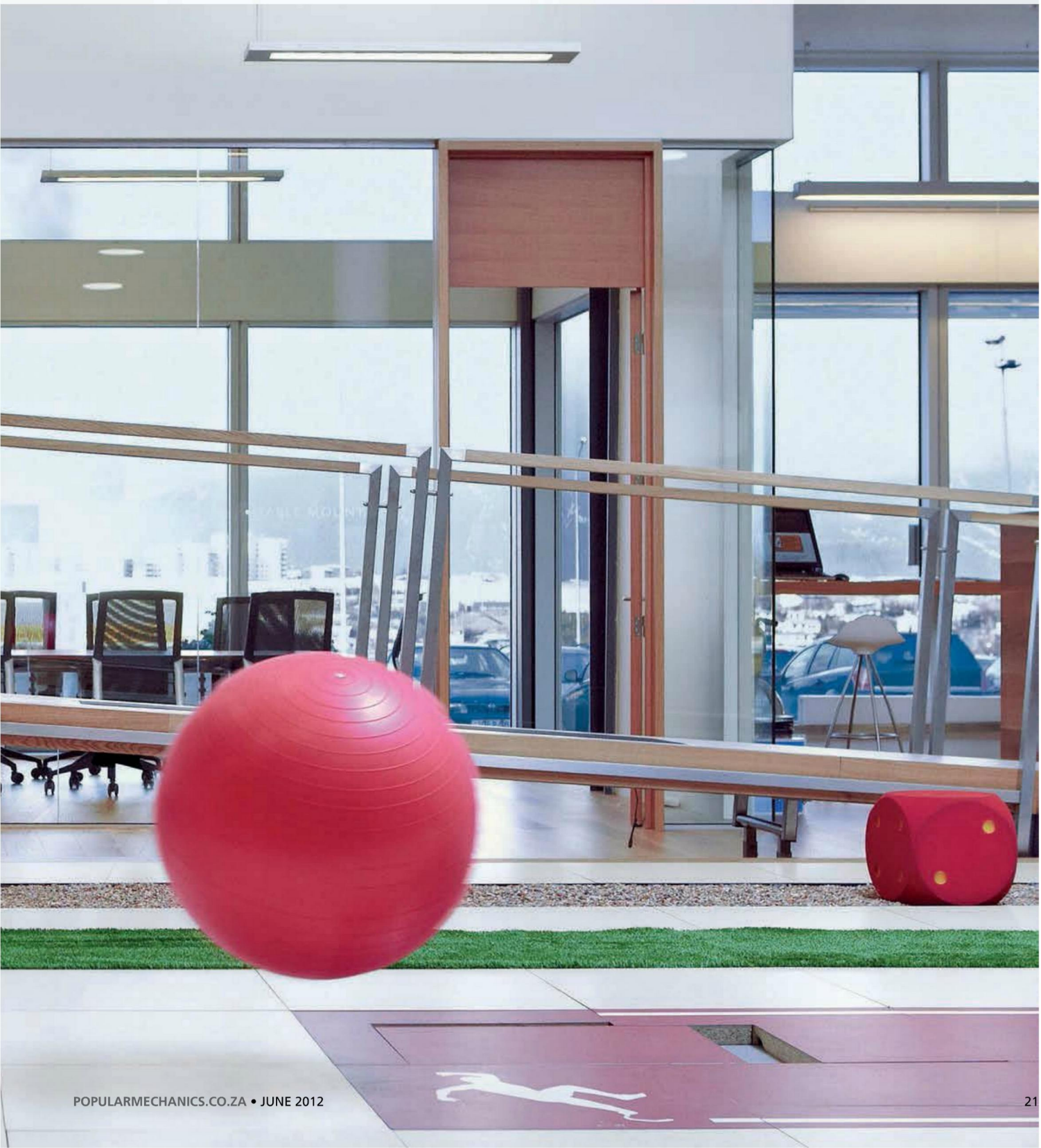
• by ERIK SOFGE • pictures by NOAH SHELDON

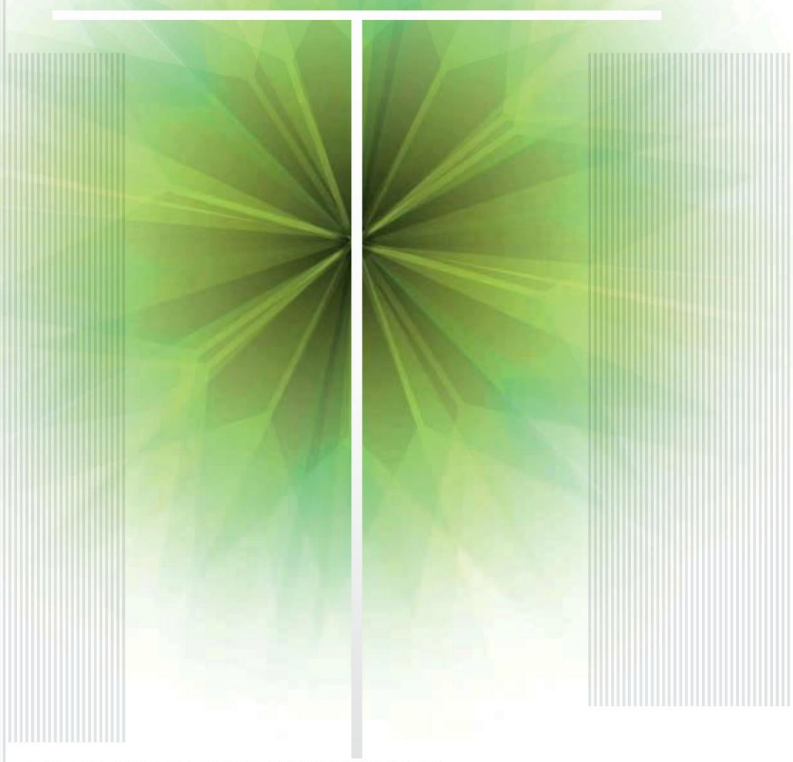


David Jonsson tests the Power Knee in Össur's Gait Lab. It's the only bionic knee on the market that powers itself forward. As an engineer at Össur, Jonsson is able to tweak prosthetic software and field-test the algorithms himself.

VIDEO > Visit *www.popularemchanics.co.za* to watch Discovery Channel's "Health Heroes" episode, showing some of the latest prosthetic technologies from Össur, including the Proprio Foot, the Power Knee and the Symbionic Leg.

BIONIC LIMBS WITH MACHINE INTELLIGENCE CAN NOW SENSE THEIR ENVIRONMENT AND PREDICT A USER'S INTENTIONS. SMARTER, STRONGER, SPEEDIER ROBOTICS WILL SOME DAY ENHANCE THE POWERS OF THE ABLE-BODIED, TOO.





THERE AREN'T ENOUGH BIONIC MEN on the planet to produce a proper stereotype. Even so, David the Farmer seems atypical. Ruddy, red-haired, and impossibly cheerful, he meets us on the gravel path outside his workshop. What I was expecting – a grizzled retiree limping stiffly through his daily chores – bears no resemblance to this 30-something mechanic climbing down from a massive tractor without hesitation, weaving between ATVs and scattered engine parts, moving from task to task with no evidence that he's part machine. After a few minutes, there are clues, though: He always turns on his right leg, and his pants gather around his left ankle, hinting at a limb that's slightly skeletal and decidedly non-biological.

Today that left leg will be replaced. That's why engineers from Össur, one of the world's largest prosthesis makers, drove an hour west from the company's headquarters in Reykjavík, Iceland, to the farm where David Ingvason lives and works. David the Farmer – the nickname they've given their star prosthesis tester, though he is actually employed as a full-time, on-site mechanic – is one of a limited pool of amputees fitted with the Symbionic Leg: an artificial knee, ankle and foot that are integrated into a single bionic limb.

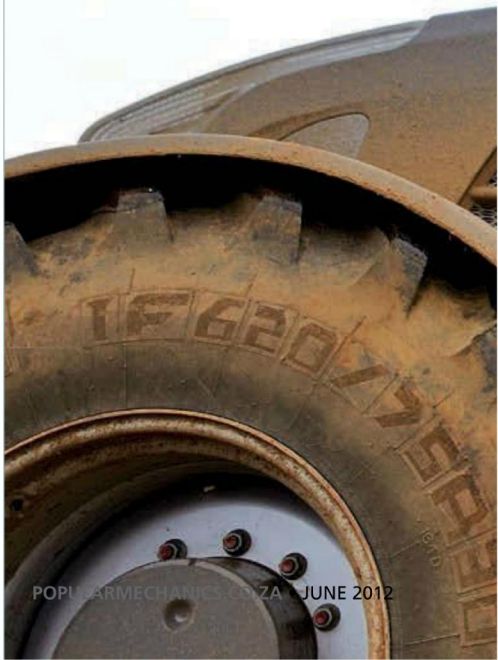
On the farmland and surrounding terrain, in tall grass, and on moss-sprayed plains of volcanic rock, Ingvason regularly destroys his leg. He fouls the motors in muck and sludge, burns them out through unremitting use, and generally grinds one of the most sophisticated auto-adaptive devices on the planet, each one worth more than some sedans, into an inert, cybernetic paperweight. According to Össur's new technology search manager, Magnús Oddsson, all Ingvason has to do is call and they'll hand-deliver a new limb. More often, he swings by Reykjavík himself wearing a backup leg and asking for a repair or replacement. Whatever David the Farmer wants, he gets – the punishment he metes out to his leg, and the data that result, are simply too useful.

Össur began selling the Symbionic model as the world's first commercially available bionic leg last year. It represents a significant shift in prostheses. The traditional half-measures, the stand-ins for lost limbs and senses, are now being imbued with machine intelligence. Ingvason's leg is, in fact, a robot, with sensors that detect its environment and gauge his intentions, and processors that determine the angle of his carbon-fibre foot as it swings forward. The same approach is being applied to prosthetic arms, in which complex algorithms determine how hard to grasp a water bottle or when to absorb the impact of a fall. Vision- and hearing-based prostheses bypass faulty organs and receptors entirely, processing and translating raw sensor data into signals that the brain can interpret. All of these bionic systems actively adapt to their users, restoring the body by serving it.

Take, for example, one of the most common prosthesis failures. A mechanical knee typically goes rigid as the heel lands, supporting the user's weight, then unlocks when pressure is applied to the toe. If that toe contact comes too early the leg collapses under its owner. The Symbionic Leg isn't so easily fooled. Force sensors and accelerometers keep track of the leg's position relative to the environment and the user. Onboard processors analyse this input at a rate of 1 000 times per second, deciding how best to respond – when to release tension and when to maintain it.

Since the leg knows where it is throughout each stride, achieving a rudimentary form of proprioception, it takes more than a stubbed toe to trigger a loose knee.

If the prosthesis still somehow misreads the situation, the initial lurch of the user falling should activate its stumble-recovery mode.



Like antilock brakes for the leg, the actuators will slow to a halt, and magnetically controlled fluid in the knee will become more viscous, creating resistance, as the entire system strains to keep the person from crumpling or toppling.

The result, Ingvason says, is that he rarely falls, or no more often than someone with two biological legs. He can drive ATVs, hike across glaciers, even ride a horse while herding sheep. "I don't have to think about it," he says.

Before he went bionic, Ingvason fell constantly. "With the old knee, it was every day, often more than once in a day," he says. "If I was walking and the toe hit something while swinging forward and I stepped on it, then I just went down. Now I'm walking on uneven ground and high grass and sand and mud and everything."

Ingvason's newly delivered limb is another Symbionic Leg, loaded with upgraded software that will allow the knee and the ankle to communicate with each other. Össur plans to develop this feature over the coming years, establishing what Oddsson calls networked intelligence. After putting it on, Ingvason limps, awkwardly at first, across dirt and gravel, past the rusting hulks of trucks and cars. Within a few minutes, the robot has calibrated itself. With Ingvason's pants leg hitched up, it's impossible not to watch the limb in action. It's harsh and alien. The gray polymer shell, which partially conceals aircraft-grade aluminium, seems too skinny to support his weight; the ankle, too delicate for the 10 000 newtons of force it was built to withstand. But the leg is nimble and so quick to react, it's as though he were born with it.

The goal of current bionic research is to recover what was taken. In Ingvason's case, it's the leg he lost nearly 12 years ago, when he stopped to help a couple whose car had broken down in the rain. While he was working, another vehicle slipped off the wet road and ploughed into him. Others' losses include arms torn off by industrial accidents or improvised bombs, and senses dulled or snuffed out by disease. Despite decades of study, the prostheses developed to replace lost functions have been at once ingenious and disappointing.

Most prosthetic devices create their

David Ingvason is a bionic leg's worst nightmare – the farm-based mechanic exposes the world's first integrated bionic limb to Iceland's most gruelling conditions. On rare occasions he's been known to recharge it from a tractor's DC jack.

own health problems. Purely mechanical legs use a complex system of gears and analogue triggers to allow people to walk, but users must hike up one hip with each step to keep the artificial toe from scraping the ground. Powered prosthetic arms tend to be locked in place during walking – and that dead weight throws off the user's balance and posture. Roughly 70 per cent of amputees develop back and joint problems, and experts suggest that such "co-morbidities" force those who might be obese or in chronic pain to become even less mobile and less healthy, ultimately shortening their lives.

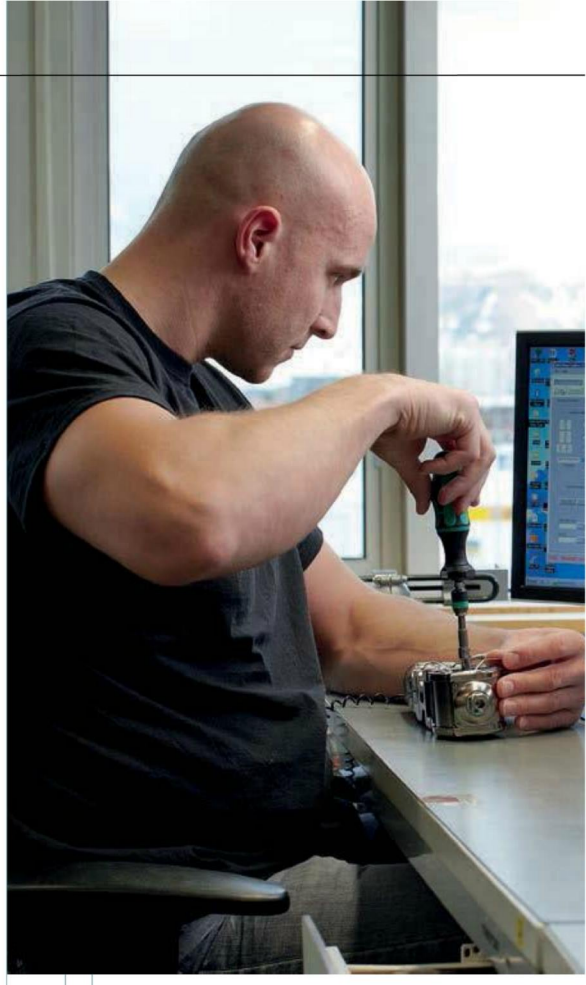
The answer, for now, is in the algorithms. Össur's Symbionic Leg eliminates hip hiking through a simple robotic twitch: the toe actuates upward during each step, performing what's called dorsiflexion. Other algorithms are more sophisticated, interpreting a torrent of sensor data as specific types of terrain. If the foot lands at a higher elevation, with the knee bent, the leg assumes the presence of stairs and adjusts accordingly. If the toe tips up on contact and the heel dips down, the artificial intelligence (AI) suspects a slope and shifts the angle and resistance to assist in climbing.

The new generation of prosthetic arms has a different set of software challenges and solutions. DEKA, the research firm founded by inventor (and 2009 PM Breakthrough Award winner) Dean Kamen, is developing the third generation of its bionic limb, known internally as Gen 3. It's backed by DARPA's Revolutionising Prosthetics programme – a $100 million (about R800 million) effort to create devices that are roughly equivalent in function to biological arms. Now awaiting US Food and Drug Administration approval, Gen 3 has 10 degrees of freedom (typical motorised arms have only 2 or 3 degrees) and a range of algorithms that mimic the precise control of its flesh-and-blood counterpart. By moving a foot, which operates a wireless controller, the user can engage various preset grasping patterns. Previous upper-limb models have used foot switches, but with nowhere near the number of grip options, nor the machine intelligence and the force sensors that guide the artificial fingers and determine how much power should drive them. "The results have been incredible," says Stewart Coulter, the Gen 3 project manager. "The other day, one of our testers was eating with chopsticks, doing a better job than I could."

The second arm funded by the Revolutionising Prosthetics programme, the Modular Prosthetic Limb (MPL), developed at Johns Hopkins University, may lead to what many believe is the endgame for bionics: direct neural control. By embedding electrodes into a subject's existing nerves, or going through the skull and implanting them directly onto his or her cortex, researchers have been able to turn thoughts into action. In a study conducted in 2010 at the University of Pittsburgh, a quadriplegic pressed the MPL's hand against his girlfriend's.

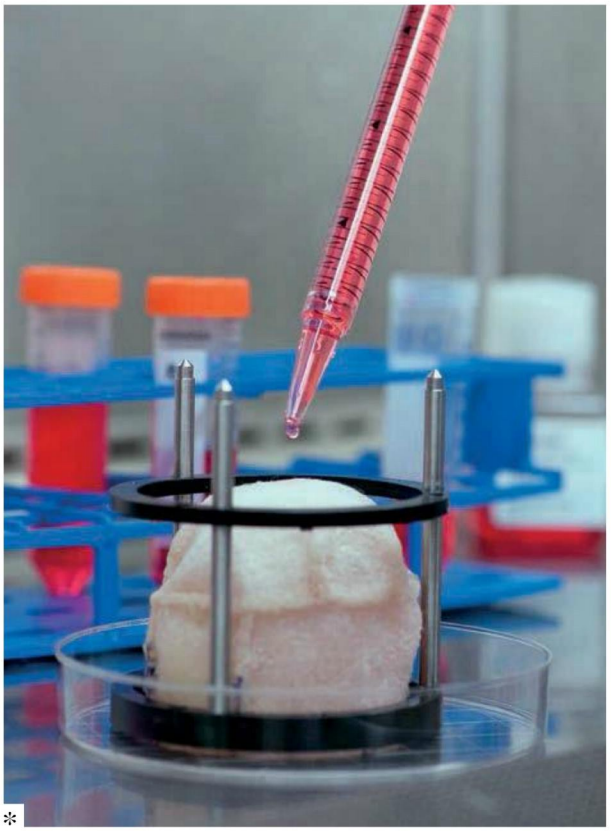
Through trial and error, processors are taught to decrypt a user's thoughts and recognise a growing list of intentions. "The system's smart. It has to be," says Michael McLoughlin, Revolutionary Prosthetics' project manager at Johns Hopkins. "The algorithms interpret what the patient is trying to do, then do it."

The MPL, in other words, isn't truly mind-controlled. The electrodes deliver orders, but it's the arm that decides how to carry them out. Or, rather, it's the network of machines – each jointed segment and finger with its own processor – that makes up the arm. The



The Modular Prosthetic Limb looks like an advanced bionic arm. In reality, it's a swarm of robots: each detachable, motorised segment houses a processor that works in concert with the others.

An engineer at Össur runs diagnostics on the Rheo Knee's primary motorised joint. Part of the Symbionic Leg, this prosthesis contains angle and force sensors that send real-time data to an onboard computer.



To re-engineer organs such as the bladder (above), scientists at the Wake Forest Institute for Regenerative Medicine populate a biodegradable scaffold with a patient's own cells. Led by 2006 PM Breakthrough Award winner Anthony Atala, the team is now building more complex organs, such as the liver and the heart.

state of the art in powered prostheses is in some ways stranger than science fiction: a swarm of bots that obey the human mind, either through cables that snake out of the skull or by taking their best collective guess at those thoughts. Stranger still, this is just the beginning.

I TIP MY FOOT UPWARD. The bionic foot that's bolted to the side of the table does the same. I press my toes into the floor and the prosthesis pivots downward into empty space. It's mirroring what I do, responding to the vibrations in my calf muscles, which are picked up by silicone-embedded microphones strapped to my bare leg. The system isn't detecting the full-blown tremors of muscle activity but a set of lower-level, initial rumblings that begin when the subject first intends to move.

Unlike the tests run in Össur's Gait Lab, where users wearing sensor rigs climb ramps and cross gravel and sand, this research is happening behind closed doors. It's part of the company's own quest to find an alternative to invasive neural control.

"What we would like to do," Oddsson says, "is exactly what the user wants. And for that we need some kind of a brain–computer interface (BCI)." Like other efforts, it's a work in progress: the 125 milliseconds it takes for vibrations to be processed into action is still painfully slow compared with the near-instant reflexes of a biological limb. A foot muscle can respond to input within 40 milliseconds – faster than even the brain can deliver a response. But it's a technology worth pursuing.

In the long term, experts agree that although implanted interfaces could change the lives of millions of patients with amputations, spinal cord injuries or neurological disorders, bionics that require major surgery will always be expensive, niche devices. For the millions suffering from debilitating strokes, or people with no serious disability but the money to pay for a wearable bionic system, a non-invasive BCI would change everything.

In other words, it's how we could reach that persistent fantasy of the able-bodied – true bionic augmentation. Even the most evasive experts I spoke with agreed that, though visions of superhuman amputees may be ridiculous, a combination of non-invasive BCIs and exoskeletons could turn decades of bionic research into a mainstream tool. California-based Ekso Bionics released the first commercially available exoskeleton in February; it's designed for

100

PRIZES MUST BE WON

SO SHARE YOUR THOUGHTS AND OPINIONS!

WE WANT TO KNOW WHAT YOU ARE PASSIONATE ABOUT, WHAT YOU ARE INTERESTED IN AND WHAT YOU REALLY THINK.

We'd like to invite you to take part in the SA magazine survey. In exchange for your time and thoughts, we'll enter you into an exciting competition with over R150 000 worth of prizes up for grabs!

R150 000 WORTH OF PRIZES

AN AMAZING ROVOS RAIL TRIP • 3 BIG GREEN EGG'S (WITH STANDS) • A GETAWAY FOR EIGHT TO ROCKWOOD LODGE • 40 PAIRS OF POLAROID SUNGLASSES • 40 CLARINS COSMETIC TRAVEL PACKS • 10 MAGAZINE SUBSCRIPTIONS

The survey will run until 30 June 2012, all participants will be entered into the draw to win one of the amazing prizes listed above. Winners will be notified in July 2012.

Big Green Egg
The Ultimate Cooking Experience

ROCK WOOD LODGES

ACT NOW!

SIMPLY LOG ON TO WWW.SAMAGAZINESURVEY.CO.ZA

THE FUTURE OF
MAN AS MACHINE

patients with neurological or spinal cord damage. Billed as a "wearable robot", the system walks under its own power, currently via a remote control. An advanced version translates shifts in balance and feedback from canes into a natural stride. "That's the right use of the techno-logy now, as a medical device," Ekso spokeswoman Beverly Millson says. "But it's really a technology platform. It's the beginning of wearing your devices, for whatever purpose you might have."

At MIT's Media Lab, prosthetics pioneer (and 2005 PM Breakthrough Award winner) Hugh Herr is still in the early stages of bionic augmentation research, with a lower-limb exoskeleton system that cuts in half the forces associated with walking. Herr, who lost both legs below the knee as a teenager, understands the need for restoration. He's spun off a company, iWalk, to market his BiOM robotic ankle-and-foot system, now in clinical trials. Yet he says the endgame of his own work would be some kind of bionic vehicle that commuters might use to literally run to the office. Imagine sprinting 100 kilometres without breathing hard, across terrain that would stop an ATV in its tracks. "Something like the mountain bike will be completely laughable," Herr says. "We'll still have trucks to transport goods. At that point, though, driving alone across town in a metal box with four wheels would be just absurd."

Before leaving Össur, I coax a few specifics out of Oddsson. He's a scientist through and through. But he must have some sci-fi-tinged vision of what's beyond the Symbionic Leg. He tells me he wants to take what Össur has learned about the human body and the intricacies of gait – the tremendous forces and physics at work in a single step – and create something that hijacks the nervous system directly. "It's not an exoskeleton. 'Smart trousers' might be more accurate," Oddsson says a little sheepishly.

The goal at first would be to help stroke victims. The device would stimulate the muscles, providing commands that the brain or damaged nerves can't. "We would use the actuators that are already there, the muscles, and simply provide a new central controller," he says.

Eventually, Oddsson says, pros-thetics research will disappear, replaced by advanced recon-structive technology. By 2050, he ballparks, limbs will be re-created – printed, grown, who knows? – and all of the arcane, biomechanical secrets collected by companies like Össur will be harnessed to finally restore flesh and bone.

It's a strange best-case scenario: that an industry will innovate itself out of existence, its research seeding other scientific fields while all of that sophisticated technology migrates towards devices that change the way millions of us, abled or disabled, live and work. **PM**

EKSO BIONICS EXOSKELETON

In February, Ekso Bionics' exoskeleton became the first to step out of the lab and into the real world. This motorised robotic lower-limb system supports the full weight of users with spinal cord or neurological damage. Onboard batteries supply 3 hours of fully powered walking.

2012

SYMBIONIC LEG

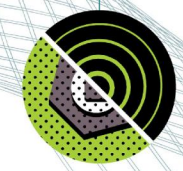
The world's first integrated bionic leg, made by Össur, recently became available to select customers; sales were due to begin worldwide this year. The Symbionic Leg self-adjusts everything from toe angle to knee resistance.

2012

BIOBOLT

Engineers continue to refine the next generation of this wireless device (tested in monkeys), which uses skin as a medium to transfer neural data to a bionic limb. The real breakthrough will be when the process provides sensory feedback. The hardest part will be writing the algorithms, says Euisik Yoon, principal investigator at the University of Michigan. "No one really knows what to say to the brain. Not yet."

2013



2015-2020

BRAIN-CONTROL RESEARCH GENERATES USEFUL SENSORY FEEDBACK, IMPROVING THE MAXIMUM LEVEL OF CONTROL IN UPPER-LIMB PROSTHESES.

PRINTED BONES

Washington State University scientists created a ceramic powder that they can use to print artificial bone scaffolds, employing a specially configured inkjet printer and CAD software. The scaffolding dissolves as natural bone grows around it. Lab-printed load-bearing bones, such as hips and knees, still remain at least 10 years off. "You have to really respect Mother Nature," chemist Susmita Bose says. "She is very, very hard to mimic."

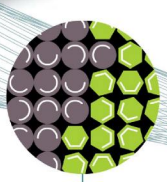
2022

GEN 3 ARM

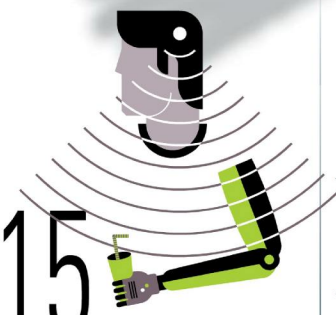
2013

DEKA's Gen 3 arm has 10 degrees of freedom and six preset grasp patterns. The company, led by Dean Kamen, plans to launch the arm with a wireless foot controller, though it could also accept commands from electrodes in the user's nerves or brain.

2016



2017



2013-2015

AFTER SUCCESSFUL HUMAN TRIALS, WIRELESS BRAIN–COMPUTER INTERFACE (BCI) SYSTEMS BEGIN REPLACING WIRED SYSTEMS, PARTICULARLY FOR PROSTHESIS CONTROL.

MODULAR PROSTHETIC LIMB

Pioneered at Johns Hopkins University Applied Physics Laboratory, the MPL has 26 articulating joints. The first commercial version will likely be controlled via electrodes on or under the skin – but arms manipulated by sensors directly on the nerves and by brain implants are in clinical trials now.

ARTIFICIAL WHITE BLOOD CELLS

These tiny plastic "smart particles", called leuko-polymersomes, mimic white blood cells, finding and adhering to infected cells. They can also be programmed to target specific cells and perform a variety of tasks, such as delivering a cancer drug. The University of Pennsylvania's Dan Hammer says the invention of more organically compatible parts could accelerate FDA approval from the current goal of five years.

Illustrations by La Tigre

ARTIFICIAL KIDNEY

An artificial kidney built at the University of California, San Francisco, replaces all the functions of the real thing in an implantable device about the size of a baseball. A series of nano-drilled silicon screens filter toxins out of the blood without the need for pumps or outside power. A bioreactor filled with specially engineered kidney cells performs other important renal functions, such as maintaining electrolyte balance. Bioengineer Shuvo Roy hopes to see it come to market in 10 years.

2022

BIONIC LENS

University of Washington researchers have been working toward a wirelessly powered on-eye display, aiming for a commercial version in 10 years. With micro-optics embedded in the lens, it could not only enhance vision, providing night vision or projecting data into the line of sight, but also restore some degree of lost vision. "For macular degeneration, the incoming image can be modified to be spread over the still-functional parts of a retina," project lead Babak Parviz says.

2022

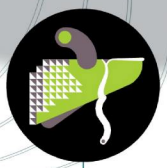
2025

EXOSKELETONS THAT AUGMENT SPECIFIC CAPABILITIES – SUCH AS STRENGTH OR SPEED – HIT THE MARKET, ALONG WITH RESTORATIVE ONES THAT RESPOND TO WIRELESS BCI.

ARTIFICIAL RED BLOOD CELLS

Also called respirocytes, these robotic blood cells consist of about 18 billion atoms – most of which are carbon – in a diamond structure that's assembled one atom at a time. They could carry hundreds of times more oxygen than natural red blood cells, allowing people to hold their breath for hours or sprint at Olympics-level speeds for 15 minutes at a time. Robert Freitas of the Institute for Molecular Manufacturing hopes to have the first nanofactory up and running in 20 years.

2032



2027

LAB-GROWN LIVER

Anthony Atala's team at the Wake Forest Institute for Regenerative Medicine has already implanted lab-grown bladders. Next up: more complex organs, such as the liver, grown from a patient's own cells on a scaffold. A full implant is likely 15 years off, but early work could provide injections of healthy cells or grafts of lab-grown tissue to repair damaged organs.

2050

PROSTHESES ARE NOW OBSOLETE, REPLACED BY RECONSTRUCTIVE TECHNOLOGY.

GREAT STUFF

HERE'S THE NEWEST GEAR YOU'LL WANT TO OWN

COMPILED BY SEAN WOODS *seanw@ramsaymedia.co.za*

← CATCH YOUR DRIFT

Want to capture and keep your adrenaline-fuelled activity for posterity? You won't go wrong with Drift's latest entry-level action camera, the HD720. Capable of shooting 720p HD video at 30 or 25 fps (frames per second), it comes with a wireless remote control, a 3,8 cm colour LCD screen (so you can see what you're filming) and a 300-degree rotating wide-angle lens (so you never miss a thing).

Aside from its additional ability to capture 5-mega-pixel still images, the camera is water-resistant down to 0,5 metres and has a built-in microphone. Other features include numerous mounting brackets, a 4x digital zoom and a rechargeable Li-Ion battery. For the serious adventurers out there, a waterproof housing is available as an optional extra. Price: about R2 300. Contact Drift on 011-781 2700 or visit *www.driftcameras.co.za*

Editor's choice

BANISH THOSE CABLE BLUES →

Listening to music or catching up with a buddy while exercising can make your workouts noticeably less tedious. The Jabra Sport Bluetooth stereo headset allows you to do both, and there are no cables to get in the way. Compatible with any smart-phone offering Bluetooth connectivity, it weighs a modest 24 grams and features a flexible behind-the-ear fit, making it extremely comfortable to wear. It comes with military-grade rain, dust and shock protection, so it's also pretty rugged. Other features include a wind-shielded omni-directional microphone and an FM radio. Price: about R1 500. Contact distributors Wintec Solutions on 011-467 2360 or visit *www.wintecsolutions.co.za*

STAY IN TOUCH →

Losing your family in a shopping centre or out on the hiking trail is a non-issue if you're equipped with Cobra's MT975 two-way radio. This nifty radio – featuring 8 channels and 121 privacy codes (providing a total of 968 combinations), rechargeable batteries and an effective range of 12 km (terrain and conditions dependent) – is more useful than you can imagine.

The silent vibrate alert for incoming calls is great for noisy or all-quiet environments. Vox (voice activated transmission) detects your voice – the sensitivity is adjustable – and transmits without the need to press any buttons, freeing up your hands for other tasks. It can also be used as a baby monitor, and scans two channels simultaneously. Price: about R900 for two radios plus charger. Contact distributor Radio Holland on 011-805 1996.

TREE FELLING MADE EASY ↑

The last thing you need when felling a tree is for it to fall the wrong way (you know, like on your head). The good news: Stihl's new Laser 2-in-1 – a laser system that mounts on the handle of their MS 261 chainsaw – makes even raw novices comes across like woodland pros.

In essence, it projects a laser beam on the ground to help you determine the direction in which the tree will fall. It has a wide adjustment range, allowing the laser line to be set according to your working environment. Once the tree is on the ground, the system kicks in again to help you cut logs to the required size without you having to fiddle with a tape measure. Price: about R2 000. Contact Stihl SA on 033-846 3800 or visit *www.stihl.co.za*

MUSIC TO YOUR EARS ↑

If you like the idea of blowing your hair back with serious, window-rattling audio, you need to pause and consider Bowers & Wilkins' stylish Panorama soundbar. Of the nine drive units housed within its aluminium case, five are devoted to the active centre speaker: two bass woofers, two mid-range drivers and an aluminium dome tweeter featuring B&W's nautilus tube technology. The remaining four drive units, located within their own enclosures to enhance performance, provide the rest of the sound.

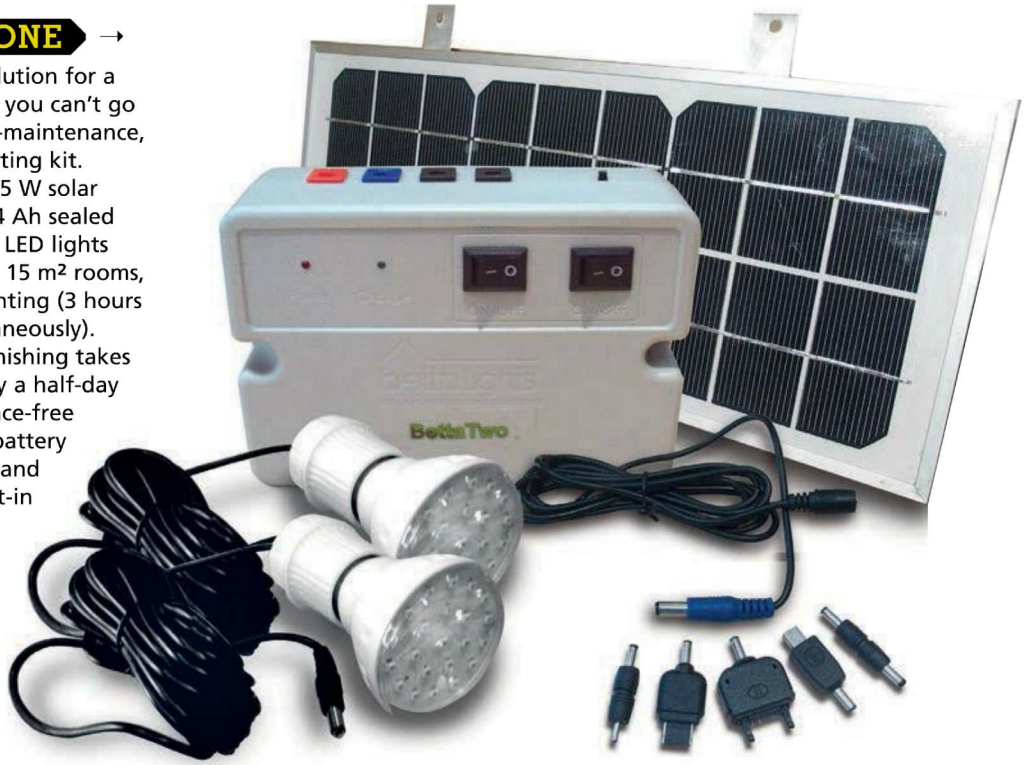
This is serious sound muscle. All nine drive units are powered by six class D amplifiers that together push out an impressive 175 watts of surround sound. Although the Panorama soundbar was designed primarily to partner large flatscreen televisions, this doesn't mean it won't work with other entertainment devices: it also provides surround and stereo sound to gaming consoles, iPods, CD players and the like. It can stand on its own or attach to a wall, using the supplied bracket. Price: about R15 000. Contact distributors HFX Systems on 011-907 9092 or visit *www.hfxsystems.com*

DARKNESS, BE GONE →

As an affordable lighting solution for a holiday cottage or camping, you can't go wrong with Bettalight's low-maintenance, compact BettaTwo solar lighting kit.

Comprising a stand-alone 5 W solar panel, controller housing a 4 Ah sealed lead crystal battery and two LED lights with wiring suitable for two 15 m² rooms, it can provide 6 hours of lighting (3 hours if the lights are used simultaneously).

After one day's use, replenishing takes 2,2 sun hours (approximately a half-day of sunshine). The maintenance-free deep discharge/fast charge battery has a lifespan of between 7 and 10 years. You also get a built-in cellphone charger with connectors for most brands of mobile phones. Price: about R1 000. Contact The Green Shop on 021-791 0821 or visit *www.thegreenshop.co.za*



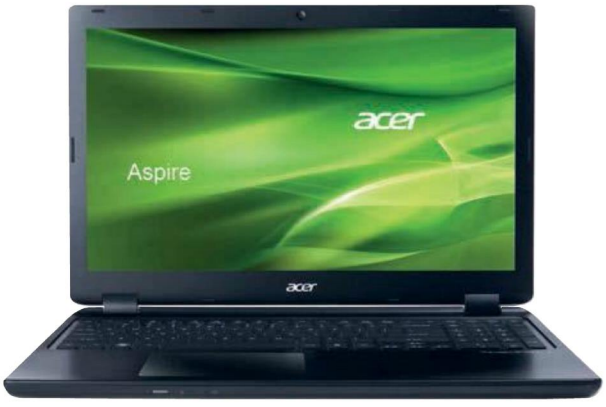
THIN IS IN ↑

When it comes to the multimedia experience, looks and performance don't always go together. However, Dell's super thin S-series monitor, the S2330MX, comes up trumps in both the looks and performance departments. Measuring just 30,3 mm thick (excluding the stand), its contemporary design ensures it'll look good in virtually any area of your home. The 58 cm full HD backlit LED screen boasts an impressive response time of 2 milliseconds and has the ability to tilt through 25 degrees. It also features a 170-degree horizontal viewing angle, and VGA and DVI-D (HDCP) connectivity, and comes with a DVI-HDMI dongle. Price: about R2 200. Contact distributor Drive Control Corporation on 011-201 8927 or visit *www.dell.com/za*

SLIM PERFORMER ↓

On-the-go individuals looking for instant computing gratification are sure to appreciate Acer's new Aspire Timeline Ultra M3. Although slimmer and lighter than its predecessors (it's just 20 mm thick), it still manages to cram a hard disc drive, solid state drive and optical drive into its svelte chassis. You get a choice of the latest Intel Core processors and dedicated graphics to ensure fast navigation and multitasking, even with graphics-intensive gaming and multimedia apps.

This is a serious performer: it takes just 1,5 seconds to boot up from sleep mode, and connects to the Internet in a blistering 2,5 seconds. But that's not all. A full eight hours of battery life gives you a full day of on-demand multimedia enjoyment and productivity. Other features include a 38 cm backlit TFT LCD screen, Dolby Home Theatre v4, and premium speakers. Prices start at about R8 000. Contact Incredible Connection on 0860 011 700 or visit *www.incredible.co.za*

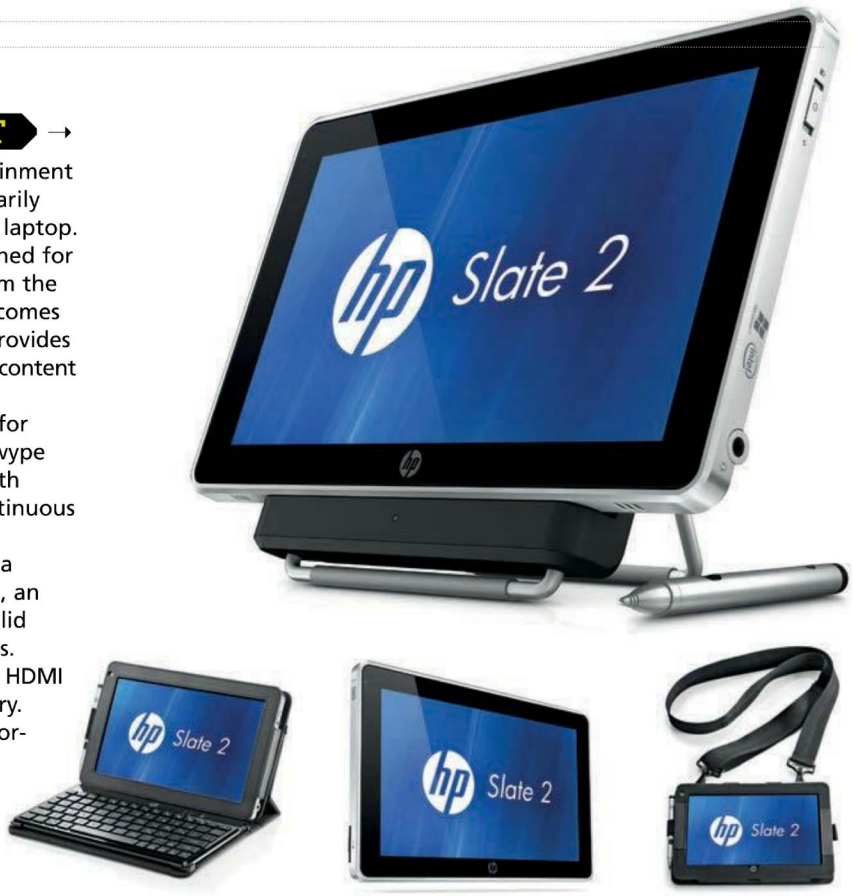


WORKAHOLIC? TAKE A TABLET →

Most tablet PCs are geared for consumer entertainment rather than business use, but that doesn't necessarily mean that if you wear a suit, you're stuck with a laptop. HP's 3G Slate 2 Tablet PC is a case in point. Designed for those whose jobs frequently take them away from the traditional desk and weighing just 690 grams, it comes with a full-featured Windows environment that provides users with the flexibility to create, edit and review content on a platform they're accustomed to.

Its 23 cm capacitive multi-touch display allows for both touch and pen inputs. There's also a new Swype keyboard that enhances the touch experience with comfortable and efficient data entry via one continuous finger or stylus motion across the keyboard.

Other features include secure data protection, a front-facing VGA Webcam for videoconferencing, an Intel Atom Z670 processor, 2 GB ram, 64 GB of solid state memory and a battery life of up to six hours. Optional extras include a dock with two USB and a HDMI port, and a Bluetooth keyboard and case accessory. Price: about R11 700. Contact Drive Control Corporation on 011-201 8927 or visit *www.drivecon.net*



HOW DO YOU BECOME A LEGEND?

BMW GS. UNSTOPPABLE ENDURO.

follow @BMWMotorradSA

Like BMWMotorradSA

www.bmw-motorrad.co.za

MAN BLING →

The type of watch a man chooses to wear speaks volumes about his interests and inclinations. Working from this premise, if he's flashing a Rolex Oyster Perpetual Milgauss on his wrist, then you know he's got serious class, not to mention a bank balance to match.

First introduced in 1956, the Milgauss, capable of withstanding magnetic fields of up to 1 000 gauss, was originally designed to meet the demands of the scientific community. It uses 904L steel – usually reserved for the chemical industry, where maximum resistance against corrosion is essential – for its case. Its blue Parachrom hairspring, crafted from paramagnetic alloy, is not only unaffected by magnetic fields, but is also up to 10 times more resistant to shocks than conventional varieties. This impressive timepiece is self-winding and waterproof to 100 m. Expect to pay about R60 000 for either the white or black dial, and about R67 000 for the green sapphire crystal dial (depending on the exchange rate). Visit *www.rolex.com*

MASTER COMPACT ↑

If you're a keen photographer who would prefer not to get bogged down by heavy and bulky lenses, you should check out Canon's latest compact, the PowerShot G1 X. With its metal body, optical viewfinder, stabilised 28 mm 4x optical zoom lens, twin control dials, customisable shortcut button and exposure compensation dial, it's a compelling package.

But as impressive as all these features are, it's the whopping 14,3 MP sensor that really makes this camera stand out from the crowd: it measures 18,7 x 14 mm – six times the size of earlier G-series sensors. Combined with the DIGIC 5 image processor, it produces stunning DSLR-quality images with an ISO rating of up to 12 800, allowing you to capture exceptional images in low-light conditions.

Other features include a 920 000-dot vari-angle LCD screen, the ability to shoot 14-bit RAW files, multi-area white balance, full HD video capture, and a built-in 3-stop neutral density filter. Price: about R7 300. Contact Canon SA on 011-265 4900 or visit *www.canon.co.za*

SAFE STORAGE TO GO ↓

Whether it's by loss, theft or fire, having your laptop – along with your irreplaceable files – abruptly vanish into thin air is something that few of us would like to contemplate. The sad truth: it happens.The obvious solution is to protect your data, then stash it somewhere safe – which is where Western Digital's new 2 TB My Passport portable hard drive comes in.

Featuring a massive storage capacity in a pocket-sized enclosure, it includes automatic backup software, so even a digital Luddite can successfully back up his or her data with ease. Built-in security features such as password protection and hardware encryption help protect files from unauthorised use. The included software provides users with flexible options: for example, you can install all the available features, just the components you require, or simply use the drive for storage without the software. You also get ultra-fast USB 3.0 connectivity along with USB 2.0 compatibility. Price: about R2 000. Visit *www.westerndigital.com* **PM**

The pocket camera for the serious photographer.

PowerShot S100

HS SYSTEM

12.1 MEGA PIXELS HIGH-SENSITIVITY CMOS

24mm WIDE 5×

FULL HD

GPS

Clear low-light shots up to ISO 6400 with **HS System**

Sharp results from f/2.0, 24mm lens with **Intelligent IS**

Quick control with lens ring, Full Manual and **RAW**

Tag and track your travels with **GPS**

High quality **Full HD movies** with stereo sound and HDMI

UEFA EURO2012 POLAND-UKRAINE

Canon OFFICIAL SPONSOR

The UEFA EURO 2012™ official logo is protected by trademarks, copyright and/or design. All rights reserved

1THREAD_4240_POP

WHAT WENT WRONG

CRUISE SHIP DISASTER

THE SINKING OF A BEHEMOTH PLEASURE VESSEL OFF THE COAST OF ITALY TURNS A VACATION INTO A NIGHTMARE FOR THOUSANDS.

BY BARBARA S PETERSON

The surreal sight of the *Costa Concordia* on 14 January 2012, crippled and capsized off the Italian coast the morning after the accident, became a symbolic image worldwide.

VIDEO > US-owned company Titan Salvage has won the bid to remove the Costa Concordia. The stricken cruise ship is to be righted and refloated. The operation is due to start in May and is expected to take a year. Visit *www.popularmechanics.co.za* to watch an animation showing how the ship will be salvaged.

Antonello Tievoli, head waiter on the *Costa Concordia*, stepped on to the bridge of the cruise ship at 9:15 pm on Friday, January 13 of this year. From the wide windows, Tievoli could see the glittering lights of his home, Giglio Island, drawing closer.

Captain Francesco Schettino knew that Tievoli's sister lived on Giglio, and invited him to the bridge as they cruised past. With its 13 brightly lit decks, the ship was more brilliant than anything on the island. The 4 200 people on board outnumbered the island's residents four to one.

The captain was no longer following his charted course – he had ordered the 290-metre-long ship to cruise at least 6 kilometres closer to the island. Insiders say that it was a special tradition for Costa liners to salute a beloved former captain, Mario Palombo, as they passed by his home on Giglio. The ship, which had earlier slowed down while Schettino lingered over a meal, accelerated to 16 knots, a brisk speed for a large vessel less than 2 kilometres from a coastline.

The ship's printed itinerary mentioned the island's proximity, but few of the 3 200 passengers were looking outside. The *Concordia* left Civitavecchia, the port city of Rome, about 2 hours earlier, and the passengers were just settling into their vacation routines. Minnesota resident Ronda Rosenthal, who had stopped at her cabin before heading to a 9:30 pm performance by Martin the Magician, looked out her porthole and saw white froth. "The waves were cresting really high, and we could see lights in the distance," Rosenthal says. "And I thought, we are either going very fast or we are very close to shore."

Schettino spoke to Palombo, only to find out that his friend and mentor was at his winter residence on the mainland. But there was no turning back; the ship was on a direct course for the rocky coast.

9:40 pm// GOING OFF COURSE

Modern cruise ships have electronic charts that show their GPS positions on screens. Any deviation from the plan entered into this system usually triggers an alarm. "It is possible that he (Schettino) disabled this for the manoeuvre," says Ted Thompson, a retired US Coast Guard captain and the senior VP of technical and regulatory affairs for the Cruise Lines International Association. "In changing the track line he would have disabled the alarm as well. He may have just turned it off and was going manually and visually."

Other equipment on the bridge could have alerted the crew to trouble – if they were paying attention. "Ships are equipped with fathometers that let you know how much water is under the hull," George Borlase, a naval architect and maritime expert, says. "But at the end of the day, there is always the human factor that overlays technology."

Schettino said he believed that he was more than a kilometre from shore, still too close by the book but not dangerously so. GPS data later revealed he was less than 300 metres from land.

At 9:45 pm, everyone onboard knew that something bad had happened: the vessel shuddered, and the passengers heard a loud grinding sound. Some later compared the feeling to an earthquake.

Rosenthal was watching the magic show when she felt the ship "lurching, like the ship was being put in reverse". She thought it was a special effect of the performance until she saw an empty stage: "I looked for the magician, but he was

FATAL COURSE

This infamous shipwreck was entirely avoidable. An initial bad decision to pass close to the island of Giglio cascaded into a tragedy that exposed the lack of preparation and professionalism of the officers and crew.

gone." The ship had hit a large rock in the Le Scole reef off Giglio.

Seconds later the lights flickered and went dark. Rosenthal and her sister, an army officer on leave from Afghanistan, headed to their cabin to get some sleep. An announcement over the intercom cited a "technical problem" with the generators and stated that power would be restored.

The impact tore a 50-metre gash in the port side. Seawater began pouring in through a hole as long as an Olympic-sized swimming pool, flooding three or more of the ship's seven watertight compartments. The generators shut down. The *Concordia* was in trouble.

Ships built after 2010 might not have foundered the way *Concordia* did with three compartments flooded. In 2008, the International Maritime Organisation (an affiliate of the United Nations) developed new standards mandating that ships remain stable with more than two compartments flooded. *Concordia*, completed in 2005, was required to meet only 50-year-old standards that the international community had deemed out of date.

Minutes after the crash, the emergency lights flickered on. The ship was drifting away from the island, already listing to the port side. "Everything is fine," crew members told passengers.

9:49 pm// A DEARTH OF LEADERSHIP

More than a decade ago, the cargo and cruise industries overhauled rules in an attempt to prepare ship crews for calamity. The key to disaster management is preplanning the response so it will be fast and organised. These plans rely on an established chain of command that divides up responsibilities during a crisis.

That idea fell apart in the darkness on the night of 13 January. The captain, according to reports and video taken on the bridge just after the impact, did not seem to be directing the action or behaving as if he was in charge.

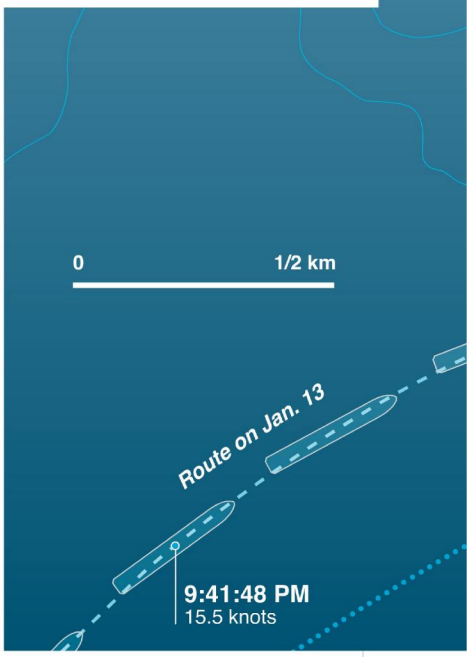
"What doomed the ship was the complete and utter lack of leadership at every point along the way," says Captain Harry Bolton, director of marine programmes and leadership development at the California Maritime Academy.

LENGTH: 290 metres
HEIGHT: 54 metres
PASSENGER BEDS: 3 780
CREW: 1 100
ENGINES: 42 MW diesel-electric
PROPELLERS: twin, fixed-pitch
CAPTAIN: Francesco Schettino

One hundred and fifty kilometres north, officers on night duty at an Italian Coast Guard station in Livorno got their first alert from the police (who received panicked calls from families of Italians onboard) that a ship in nearby waters was in trouble. Italian Coast Guard Captain Gregorio de Falco called the *Concordia*'s bridge, where officers told him, "It's okay, it's just a technical problem." No mention was made of the gaping hole in the ship's side.

As it took on more water, the *Concordia* continued to list perilously. Dishes and silverware tumbled off tables; serving carts and other furniture slid down decks.

People emerged from their staterooms wearing pajamas and life vests. Crowds formed and confusion reigned; few knew the location of their lifeboat stations. That information would have been part of their muster drill, required by law to be performed within 24 hours of boarding. But the ship was in the first hours of its cruise, so the 696 passengers who boarded



Map by Stamen Design

Picturess by AP/WIDE WORLD photos (opening page and captain), Getty images (*Costa Concordia*)

A Captain Schettino steers at least 6 kilometres off his planned course. The manoeuvre – which has been performed before – is done to "salute" a colleague on the island. The ship's speed increases to 16 knots, too fast for a large vessel travelling close to shore.

B The ship's port side hits a rock about 300 metres feet off the Giglio coast. The 15-knot impact rips a 50-metre gash in the hull.

C The flooding ship loses main power. Schettino or his crew likely apply the remaining power to ground the vessel using its bow thrusters. Because of the shallow draught, the boat tips steeply.

D Almost 45 minutes after impact, an officer on the bridge shouts, "Captain, the passengers are starting to get into the lifeboats on their own." Shortly afterward, Schettino orders an evacuation. The *Concordia* is listing so steeply that some lifeboats are inaccessible. The pitch also complicates their deployment. "We kept banging against the ship," says passenger Nancy Lofaro, who took the cellphone picture of the lifeboat below. "People were screaming."

The ship capsizes in the shallows. The last passenger leaves *Concordia* about 3 am. Thirty-two people die from drowning or exposure.

GIGLIO ISLAND
Italy

PORT GIGLIO

10:56:35 PM
0.0 knots

10:34:54 PM
0.7 knots

9:54:28 PM
2.4 knots

9:48:15 PM
5.7 knots

10:14:36 PM
0.9 knots

9:45:20 PM
13.5 knots

9:44:04 PM
16 knots

Typical route

Most of the passengers on the *Concordia* boarded that day for a pleasant trip along Italy's western coast. (The maps have been rotated to show the ship's track.) When the *Concordia* struck a rock – a piece of which remained embedded in the hull (right) – the voyage turned tragic.

MAP METHODOLOGY // Nearly 10 years ago, ships were required to install transponders that reported their speed and position to other vessels within VHF range. A Dutch firm called Quality Positioning Services started installing onshore receivers that collected these signals. "We save the ships' tracks," says Scott Nesbitt, general manager of QPS's Houston office. "We offer a playback of an incident to insurance companies during accident inquiries." PM created the map above using QPS's data, provided to local receivers every 5 seconds.

Pictures by aP/WIDE WORLD Photos (rock), Corbis (Port Giglio)

that day had no idea where to go.

The crew, lacking guidance and information, told passengers to stay put. "At this point, the crew was just as much in the dark as the passengers," says John Konrad, master mariner and founder of gCaptain, a maritime website.

Officers trained in the United States must take additional instruction, but virtually all cruise ships go to sea under a foreign flag and employ officers who were trained abroad.

10:15 pm// MANAGING A CATASTROPHE

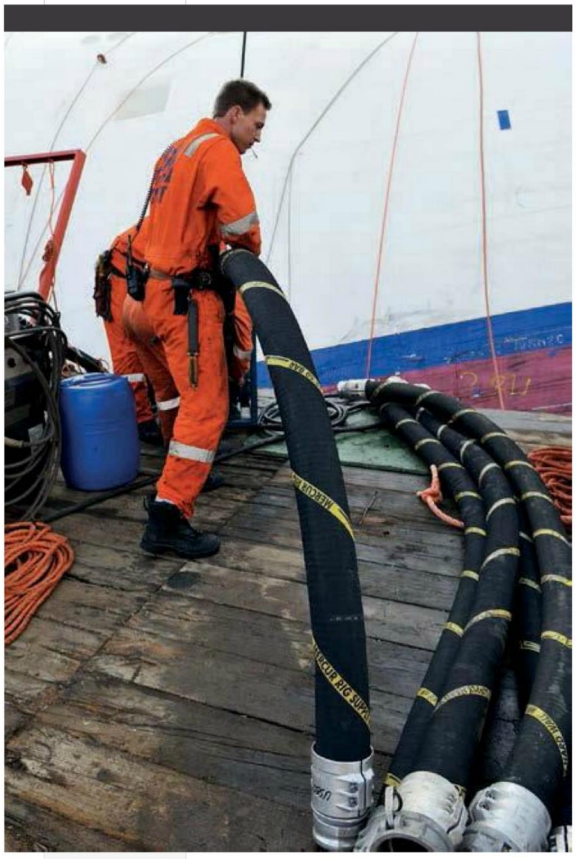
Schettino, for all his other mistakes, seems to have done what he could to deliver his crippled ship to safety. "I like to say when I teach cadets, for every thing that goes wrong you have to do one thing right to fix it," Bolton says.

Ship groundings are rare but not unheard of, and they are rarely fatal. Just a week before the *Concordia* crash another large luxury ship, the *Poesia*, hit a reef off Grand Bahama Island, where it languished for more than 12 hours until high tide enabled tugs to set it free.

There is anecdotal evidence – which will come to light when investigators release details from the ship's black box – that Schettino tried to stop the ship and waited for a similar tow to shore. If so, the anchor failed to catch.

Without its main engines, the *Concordia* drifted for an hour. GPS tracking data show the ship's speed dropped to near zero. It's not possible to steer a ship with no propulsion, Bolton says. Schettino still had options, though. "There's limited backup power from the auxiliary engines, which are usually located on a higher deck to minimise the risk of flooding," Bolton says.

About 30 minutes after the impact, Schettino appears to have used auxiliary power to engage the ship's bow thrusters. This is a standard method of docking, but Schettino may have used these to push the vessel toward land. The manoeuvre probably saved lives but had unintended consequences. "He was trying to get the ship to the shallow area where he thought it would remain upright," Bolton says. "He assumed wrong."



Most salvage operations start by removing the oil from a stricken ship. Not only is the fuel an environmental hazard, its weight prevents the salvors from refloating the ship.

Nancy and Mario Lofaro from New Rochelle, New York state, alarmed by the sharply pitched deck, ran to their cabin for coats and emergency gear. On the way, the ship lurched again. "There was a loud noise – everything went crashing to the floor," Nancy says. The *Concordia* had struck shore, where it was bound to capsize.

'What doomed the ship was a complete and utter lack of leadership at every point along the way.'

– Captain Harry Bolton, California Maritime Academy director of marine programmes and leadership development

10:58 PM// DELAYS COST LIVES

The captain gave the official order to abandon ship. By law, all 26 lifeboats have to be launched within 30 minutes of an evacuation order. But the crew's delay made an orderly escape impossible. By then the *Concordia* was tilting more than 20 degrees, rendering some of the portside boats useless. "The crew was too late and lost the window of opportunity," Bolton says.

Rosenthal and her sister were in one of the first lifeboats to drop from the ship. They arrived on the Giglio pier at 11:14 pm; on arrival a volunteer rushed up and asked for their lifejackets. They were told an estimated 500 passengers were trapped where they couldn't retrieve lifejackets from their rooms.

At around 11:30 pm, Schettino boarded a lifeboat (or, as he claims, fell into one) and headed to land, abandoning the ship and hundreds of passengers.

Picture by Getty Images

RIGHTING A SHIP GONE WRONG

So, how do salvage experts float a capsized 114 500-ton cruise ship? If the owners want it whole, the ship must be patched, then drained of water and oil. "Modern ships come with electronic blueprints and stability calculations," says Tim Beaver, president of the American Salvage Association. "Engineers use these to create simulations." Then hydraulic winches onshore and offshore pull the vessel by reeling in chains (blue and orange, below). A restraining line (yellow) unspools to keep the ship from tipping too far the other way.

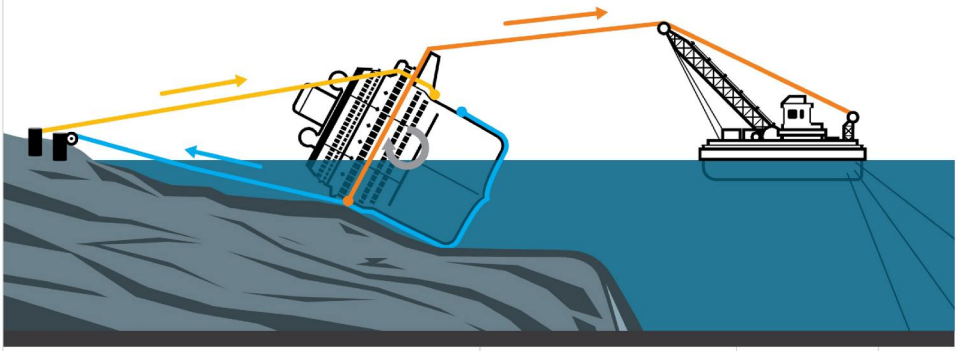


Illustration by DOGO

Other officers onboard the *Concordia* reportedly followed suit, while some ferried passengers to land in the lifeboats.

Nancy Lofaro recalls the agonising wait inside the lifeboat as crew members fumbled to lower it. The ship's pitch made it nearly impossible to lower the boat into the water. "We kept banging against the ship," she says. "People were screaming." The craft settled safely into the water; it took less than half an hour to reach shore.

Schettino beached the *Concordia* in about 15 metres of water. When the ship finally keeled over, dozens jumped or fell off the ship, some in their evening clothes. The water was 14 degrees – a temperature at which limbs become immobile in minutes and hypothermia can manifest within an hour.

12:42 AM// THE AFTERMATH

By then the Italian Coast Guard helicopters had pinpointed the wreck by its last transmitted GPS data and were spotting survivors with infrared cameras. Coast Guard helicopter pilots dropped harnesses to hoist more than 100 people clinging to the decks that were above water.

Coast Guard officer De Falco tracked down Schettino on his cellphone. The Coast Guard officer demanded that Schettino return, but was rebuffed. "Perhaps you saved yourself from the sea, but I'll make you pay," De Falco shouted.

The *Concordia* death toll reached 25 – some victims were still in their cabins – with seven missing. Schettino faces charges of manslaughter, and his first mate and several crew and Costa executives are also under investigation.

It's hard to tease solutions to recurring problems from the actions of the *Concordia*'s officers. One lesson has already become industry practice: lifeboat drills are held before a ship departs, instead of within the first 24 hours of a cruise.

The *Titanic*'s sinking, despite the human errors that caused it, became a metaphor for unearned faith in technology. The wreck of the *Costa Concordia* may spawn a different moral: beware the hubris of those in charge who may be taking your safety for granted. **PM**

SURVIVE YOUR CRUISE

Holidays should be relaxing, but there are some simple ways to stay safe in case of a maritime emergency.

- Locate your lifejacket in your cabin as soon as you arrive; practise putting it on.
- Don't wait for the required safety drill to memorise the location of your assigned lifeboat.
- Work out how to get to your muster station – the place you should go to in case of an emergency – from any deck on the ship, not just from your cabin.
- Pack a couple of torches in case there's a power outage.
- Recognise the evacuation signal. The standard alert is seven short horn blasts followed by one long one.
- Learn where lifejackets are stowed elsewhere on the ship in case you can't gain access to your cabin.

Celebrate Father's Day with Popular Mechanics

Download the barcode-scanning software for your phone from http://get.beetag.com, install it and launch. With this application you can "scan" the barcode with your phone to see more of the Ford Focus!

To subscribe for only R270 for 12 issues, or extend your annual subscription for just R234, plus enter the Ford Focus competition and get your Solar Car (while stocks last) – simply contact us with this code: 12/06/SP/PM

How to subscribe:

Rules: The Ford Focus competition ends on 31 August 2012. Entrants must be contactable by telephone. The winner must be over 18 years and be in possession of a valid driver's licence. The prize is not transferable, nor can it be converted into cash. The prize vehicle will be used at Popular Mechanics's discretion for promotional purposes and selected editorial assignments during the campaign period (March to August 2012). The prize vehicle

thegreenshop

Spoil your Dad this year with a gift that gives the whole year round – PLUS you'll be entered to WIN an all-new Ford Focus and we'll send you a solar-powered model racing car FREE to make this the perfect Father's Day!

Subscribe to POPULAR MECHANICS for 12 months at R22,50 per issue (a **25% discount**), or just R19,50 per issue if you are an existing subscriber (a **35% discount**), and you could **WIN** a dynamic new Ford Focus Trend 1.6 worth **R233 290**!

We will also send you a gift for your Dad – the Solar Speedy Car kit from The Green Shop (and if you play your cards right, he might let you help him assemble it). The tiny solar panel on its 'roof' produces a useful 0,3 watts, making sure the car gets up enough speed to go up inclines. The Green Shop was founded to source products that were eco-friendly to help keep SA 'green' – you can find their range online. Visit **www.thegreenshop.co.za**

Back to our prize. The all-new Ford Focus combines dynamic exterior design with a driver-focused interior, featuring a cockpit-style layout and superior craftsmanship. With its striking front end, sleek profile and athletic stance, this Focus enjoys sporty and contemporary styling while maintaining the comfort and practicality characteristic of the Focus brand.

Maximising sustainability was a primary goal for the all-new Focus. In addition to minimising CO_2 emissions through high-efficiency powertrains, weight saving and improved aerodynamics, the new technologies ensure that the Focus represents a green and sustainable vehicle choice. This holistic approach addresses the entire life cycle of the vehicle, from eliminating allergenic substances from the interior to incorporating recycled and renewable materials.

www.ford.co.za

SAVE R89

Ford

This price offer is valid until 30 June 2012, while stocks last and only for South African subscribers.

www.magsathome.co.za

subs@ramsaymedia.co.za

'POP' to 32698.
R1.50 per SMS.

0860 100 205 tel
0866 704 101 fax

will have promotional kilometres on the odometer and colour may vary from image. The prize vehicle will carry POPULAR Mechanics livery – to remain on the vehicle for at least 12 months after the draw (until September 2013). Employees of RamsayMedia, Ford, and their immediate families, their advertising agencies and public relations agencies may not enter. The judges' decision is final and no correspondence will be entered into.

Say hello to your future!

After three groundbreaking years as host of the annual PM Inventors Conference, Popular Mechanics is launching a new and even more ambitious event that's destined to light a fire in South Africa's vibrant tech community. Titled **FutureTech**, it's a forward-looking conference aimed at anyone who cares where their world is heading, embracing and celebrating technologies that are already changing our lives beyond recognition.

Breathtaking advances in computing power, the explosive spread of wireless connectivity, the ever-evolving Internet, breakthroughs in consumer tech, the social media landscape, humanity's relationship with technology, our automotive future… all this, and more, will be tackled by presenters at the top of their game. They'll introduce a slew of fascinating concepts, deconstruct the most significant breakthroughs, and reveal what's coming next. The theme of the inaugural conference is **"Connect"**, a word that will resonate with anyone who understands the mechanics of the 21st century.

The inaugural **FutureTech** conference happens on 25 October 2012 in Johannesburg; bookings are open now. To reserve your seat, please e-mail Nomfundo Calana on *nomfundoc@ramsaymedia.co.za* or call her on **021-530 3204**. If you would like to receive updates on the programme and details of our presenters, e-mail Kate Downs at *kated@ramsaymedia.co.za* with **"FutureTech updates"** in the subject line.

In the meantime, here's a small taste of what's to come (more programme details will follow in the coming weeks):

GEORGE ELLIS, Emeritus Distinguished Professor of Complex Systems in the Department of Mathematics and Applied Mathematics at the University of Cape Town. Professor Ellis co-authored *The Large Scale Structure of Space-Time* with University of Cambridge physicist Stephen Hawking (in 1973), and is considered one of the world's leading theorists in cosmology.

HIS SUBJECT: "Science, Technology, and Humanity."

TIM NOAKES, Professor in the Discovery Health Chair of Exercise and Sports Science at the University of Cape Town. He is also director of the UCT/MRC Research Unit for Exercise Science and Sports Medicine, and co-founder (with rugby legend Morné du Plessis) of the Sports Science Institute of South Africa.

HIS SUBJECT: "Your Body, Your Future: Getting the Science Wrong."

iStockphoto/Lexx

SURPRISE GUEST PRESENTER. We will shortly be introducing a high-profile personality from the cyber-universe who will discuss new breakthroughs and exciting opportunities in the future of Search, the exponentially expanding Web, and more. Watch this space.

PITCH IT TO THE PANEL. Reprising a popular segment from last year's event, we'll be inviting finalists from our annual PM Inventors Competition to present their inventions to our panel of experts (and to you, the audience) for comment and advice. You'll be impressed and inspired by their home-grown ingenuity.

Footnote: An important element of last year's INVENT 2011 initiative, PM's annual Inventor of the Year Competition, is back again this year – and it's even better than before, with bigger cash prizes. Details of the competition appear elsewhere in this issue of PM.

iStockphoto/N_design

JUST THE FACTS

- The one-day FutureTech conference takes place on 25 October 2012 in Johannesburg.
- Only 200 seats are available at an "early bird" cost of R1 600 each (offer closes on 31 August 2012). Thereafter, the fee increases to R1 900.
- All bookings close on 12 October 2012. Programme updates will be announced via our Web site, our weekly Web letter, our Facebook page and other media channels.

futuretech2012

TOMORROW'S TECHNOLOGY TODAY ● Popular Mechanics *Be the first to know*

Popular Mechanics

FIVE RULES FOR INTERNET SAFETY

The best defence against phishing, malware, data theft and privacy invasion is you.

> BY JOHN HERRMAN

If there isn't such a thing as an Internet Safety class, there should be one. In some US states, it's a required in high school: education department teaching materials include documents such as "Sexting: Implications for Schools" and "Cyberbullying and School Policy". These are the digital equivalent of a self-defence class. Common online threats are less sensational – and, thankfully, preventable. Though the problems are technological, the solutions are behavioural. Just five rules can help anyone stay safe online.

CHANGE YOUR PASSWORDS

"Change your passwords" is the "eat your vegetables" of the tech world – we all know we should do it, yet most people don't. But changing passwords addresses only part of the problem: there's not much point in switching to new passwords if they're not good ones, or if you're using the same one for every account.

What you're trying to fend off isn't some hacker hellbent on guessing or decoding your password; a more realistic concern is that, when a large Web site you use gets hacked, an opportunistic criminal could take the leaked information – your username, e-mail, and password – and try it out on other sites.

An ideal password strategy looks something like this: new, 20-character alphanumeric passwords for each of your online accounts every month. A more reasonable strategy might look like this: new, six-character alphanumeric passwords for each of your accounts every three months. No strategy is foolproof, but no strategy is foolish.

LEARN E-MAIL FORENSICS

It's always a little funny to get an e-mail from a bank you don't use, asking for information about an account you don't have. This kind of scamming, or phishing, is often clumsy to the point of absurdity.

What's less funny is when the bank is your bank, and the e-mail looks legitimate. Some phishing scams replicate organisations' e-mails exactly and even spoof e-mail addresses. There are a lot of ways to identify this advanced kind of phishing attack, but there's one technique that's guaranteed to work: checking e-mail headers.

Think of e-mail headers as breadcrumbs showing the path of the message from its origin. The method for finding headers differs from program to program, but it's usually somewhere in the View menu – in Gmail, it's labelled Show Original and hidden in a drop-down menu for each e-mail. Once you see the headers – they look like lines of code – look for a line that says "Received from". If the address doesn't match the organisation the e-mail is allegedly from, you've hooked a phish(er).

COVER YOUR TRACKS

Free Web sites are supported by ads, and Web ads are much more valuable to the advertiser if they're well targeted. Using files called tracking cookies, websites gather information about your browsing habits to serve relevant ads elsewhere. Searching for a product on Amazon can result in ads for that product appearing on Google. Search something on Google and you might see it again on Facebook.

The best way to stop this tracking is to install a browser add-on. Firefox users can download a free extension called Priv3 that limits the ability of social networking sites and search engines to track your online movements. Chrome users should try Adblock Plus, which can be used to prevent tracking or block ads altogether. (Remember, though, most of your favourite sites depend on ad revenue to survive.)

INSIST ON ENCRYPTION

A typical interaction with a Web site goes like this: you either click on something or enter text into a box. This information is then sent over your Internet connection – often through a Wi-Fi network – to the Web site you're looking at. The problem with this system is that the information sent back and forth between user and site, including passwords, can be exposed to other people on the same network. The availability of free "packet-sniffing" tools, such as the Firefox extension Firesheep, has made stealing information on public networks (coffee shops, airports) frighteningly easy.

Legitimate sites that request private information will almost always use something called SSL, which is a protocol for encrypting data before it's transmitted from user to website and vice versa. A site that's using SSL will have two qualities: its URL will start with https instead of http, and there will be a small padlock icon next to its URL in the address bar of your browser. If the lock is broken, or red, the site's SSL certificate – which must be issued by a trusted third party – is either expired or invalid. In other words, your data is not safe.

Some sites that support SSL for logins and transactions might not support it for all site functions. To trick a site into using SSL, simply add an "s" to the "http" in the URL. If the site supports SSL, your inputs will be encrypted. (Firefox users can install the "HTTPS Everywhere" add-on, which automates this process.)

SECURITY ALERT

GADGET THEFT

Computers offer instant access to the most intimate details of our modern lives. Laptops let us take our computers almost anywhere. Combine those two truisms and you see the unique vulnerability that laptops present. Access to all your files, stored passwords, bookmarks, and financial info by a stranger is only one inattentive moment away. Here's what you can do after the fact – and, for that matter, before the fact.

What to do if your laptop gets stolen:

Change your passwords: lock down your e-mail account first, as it likely contains info about other accounts.

Notify your bank, credit card company, and others: almost anything you've accessed on your laptop is at least a little vulnerable. Consider a fraud-alert service.

Call the police: not because you're likely to get your laptop back, but as a matter of principle.

What to do BEFORE your laptop gets stolen:

Require a password. Not just to log in, but every time the laptop screen is opened. There's one downside to this: laptop-tracking software such as LoJack and Find My Mac won't function without an Internet connection, and password protection will likely prevent a stolen laptop from connecting to the Internet.

Back up everything. This is a good habit for any computer, but especially for theft-prone laptops.

Attach contact information. Just in case your "theft" turns out to have been a misunderstanding. An e-mail address will do just fine.

MANAGE YOUR IDENTITIES

Anything you post on a social network can be used against you in a court of… well, anywhere with an Internet connection. On your Facebook page, or your Twitter feed, or your LinkedIn account, exercising caution is common sense.

As they've become more popular, these social networks have grown deep roots in the Internet. Countless third-party sites depend on users' Facebook accounts, Google logins, and Twitter handles to register for new services or to leave comments. If you've logged in to a site using an account that's associated with your real name, you should assume that everything you post can be traced back to you, be it a silly joke or an overly casual comment.

If you don't want to use your real name to, say, comment on a news story, see if the site allows you to create a separate account with an e-mail address. If a site requires a social network account, make a dummy. Twitter and Google don't mind if you set up an account with an alias. Facebook doesn't allow it, but they don't really check either. **PM**

Distributed by **Awesome Tools**

Tel: 021 981 6672 | Fax: 021 981 6730 | E-mail: sales@awesometools.co.za | Website: www.awesometools.co.za

* Luminous flux (lumens) and max beam distance (meters) are measured in the brightest function when switching on with new set of fresh alkaline batteries. These are average values and may vary +/- 15% depending on type of chip and batteries.

** Average hours of burning life as measured in the least energy-consuming mode and until residual luminous flux amounts to 1 lumen.

LED LENSER®

Creating New Worlds of Light

NEW ON THE BLOCK

> COMPILED BY ANTHONY DOMAN > anthony@ramsaymedia.co.za

AUTO CHINA

NO LONGER A BIT PLAYER

China's motor industry is no longer a sleeping giant. For one thing, it's not asleep. As the country's wheels sector assumes ever greater importance – and size – expect the traditional power bases of the industry to shift. Everybody wants to be there; and in the case of Auto China in Beijing, they were there, even to the extent of making big announcements.

LAMBORGHINI URUS

OFF-ROAD ROCKET

Bentley grabbed the headlines at Geneva with its SUV offering, but the Italian branch of the VW family hit back in Beijing with what it calls the ultimate super athlete in the SUV segment. The Urus concept boasts a 440 kW engine, but at the same time emits the lowest CO_2 figure in its segment. Lamborghini is looking to the Urus to bring in a slew of new buyers, including the company says, families and Lamborghini customers who have so far driven SUV models from other brands. Porsche, you have been warned. The Urus is being aimed mainly at the USA, the UK, Germany, Russia, the Middle East and China and about 3 000 a year are likely to be built.

Light weight was a design priority, even in the interior, with massive use of innovative carbon fibre technologies. Lamborghini's expertise in carbon materials is shown to good effect in the centre tunnel's open, skeletal structure made from Forged Composite, only partially clad in leather-upholstered cushioning. The four seats are also made of Forged Composite.

A notable exterior feature is adaptive aerodynamics. In combination with variable bodyshell height, the height-adjustable front spoiler aids high-speed stability when set low, and improves approach angle when raised. A deflector along the upper edge of the rear window channels airflow to an adjustable spoiler.

Inventive use of lighting technology has created a striking all-LED front end, with headlights in a horizontal, heptagonal form featuring two arrays each with three high-performance LEDs.

Blast from the past. Tractor manufacturer-turned-industrial magnate Ferrucio Lamborghini believed fellow Italians Maserati and Ferrari weren't the only people who could build supercars. Having proved the founder's point, the company then decided that what the world needed was the same performance, off-road.

Unfortunately, they were a couple of decades early. The LM002 of 1986 almost made the company's Countach look subtle, with a monstrous exterior, luxurious interior, a 336 kW 12-cylinder engine and a top speed exceeding 210 km/h. In its six years of production, just 300 were built.

PEUGEOT URBAN CROSSOVER CONCEPT

CITY CAR NOUVEAU

"A worldwide reflection on the motor vehicle in a world that is ever more urbanised." That's so… *deep*. Seriously, Peugeot's description of its Urban Crossover Concept comes, the company says, against this backdrop: "At the start of the decade, 30 cities in the world had populations of more than 10 million. By 2050, 5,3 billion inhabitants of the planet will live in mega-conurbations."

Ulp. Fortunately, it's not all gloom. Peugeot's reflections on these realities led to a multi-role compact that's "elegant and cheeky, refined and charismatic, sporty and seductive". Using its strong background in compact cars and marrying this with the successful 3008 crossover and the SXC concept car shown at Shanghai last year, with a range of international design inputs Peugeot crafted a trendy runabout that's created to be at home in a variety of situations – most notably in the city.

RENAULT TALISMAN

ESTABLISHING A BEACHHEAD

They're calling it a world premiere, though whether the rest of the world will get the Talisman is another matter altogether. Renault says the Talisman, its new flagship sedan for the Chinese market, embodies its promise of "casual luxury" that is winning over more and more Chinese customers. The car will be produced in Korea at Renault Samsung Motors and exported to China at a relatively ambitious base price of 38 652 euros. The company has big plans to increase its modest presence in China, the world's biggest automotive market, with the goal of establishing local production.

MERCEDES-BENZ VIANO VISION DIAMOND

HOME, JAMES

There might be entirely practical reasons for desiring a chauffeur-driven luxury van (being confined to a wheelchair, for example). Our guess: size matters. Or, of course, you happen to be the A-Team.

This concept from Merc separates the chauffeur from the passenger compartments and features "extravagant appointments down to the last detail". These appointments include sound and light control by iPad or iPhone.

Unashamedly non-discreet, this limovan sports gold accents on the body and wheels and a diamond motif. An innovative multimedia unit allows passengers to choose between a business setting or a comfortable ambience for relaxing. Windows are equipped with the Magic Sky Control system, which uses an electric current acting on a liquid in the window glass to darken or lighten them to alter interior lighting, something like an LCD effect.

Forget cupholders: the Diamond has champagne glass holders for its silver bubbly flutes, as well as an automatic champagne bottle cooling unit (five bottle holders are built into the side panelling). Eight diamonds embedded in the interior trim refer to the lucky Chinese number eight.

Additional equipment features include the Bang & Olufsen "BeoLiving Viano" high-end sound system, which can be operated via Apple's ubiquitous tablet and phone. A special app was developed exclusively for this control feature; the devices are secured in a docking station in the centre console. The powered retractable video screen can be used for TV, videos or surfing the Net and videoconferencing.

Sadly for local plutocrats, the left-hand-drive-only Diamond will not be available here.

MERCEDES-BENZ CONCEPT STYLE COUPÉ

COMING ATTRACTION

The car you see here may be a concept, but it's on the brink of production. The Concept Style Coupé that highlighted Mercedes-Benz's Beijing stand offers, the company says, an insight into the next member of its new compact car family. It's a sporty coupé for the mid-size segment; the production version is due next year under the name CLA. Tech features include a new 155 kW four-cylinder turbo petrol engine with 4MATIC all-wheel drive and 7G-DCT dual-clutch automatic transmission.

And it's all part of a grand plan, says M-B boss Dieter Zetsche. The Mercedes-Benz 2020 strategy is aimed at getting it to overall leadership – in sales, too – of the premium sector.

FIAT VIAGGIO

COME FLY WITH ME

The first Fiat-Chrysler twin project is described as an all-new world-class vehicle with high levels of refinement and craftsmanship that breaks the mould in China's compact sedan segment. Its design is by the Fiat Group's Style Centre, so although aimed at making a Chinese breakthrough it may have prospects in other parts of the world (its Italian name means journey; its Chinese name means fly).

The new four-door, five-seater sedan is based on the CUSW (Compact US Wide) architecture, said to be the most advanced within the Fiat Group, and it is also the basis of the new Dodge Dart shown at Detroit in January. That architecture derives from the Compact elements originally developed for the Alfa Romeo Giulietta.

The Fiat Viaggio will be the only car in its segment to offer sophisticated T-Jet Turbo engines (1.4L T-Jet 120 HP and 150 HP) the T-Jet Turbo engine with either a 6-speed dual dry clutch or a 5-speed manual transmission.

AUDI A6 L E-TRON CONCEPT

LUXURY MEETS NEW ENERGY

An impressive 80 km on pure electric power at 60 km/h is possible using the A6 L e-tron concept. Existing Audis using electric power as part of a hybrid drivetrain are capable of 3 km at best.

The first luxury-class e-tron concept car from Audi, the concept is a plug-in hybrid specifically designed to fulfil Chinese needs. Audi describes it as an important step towards future electric mobility in China.

Based on the new A6 L – the most successful premium car and Audi's best-selling model in China – the e-tron concept uses a parallel hybrid system that combines a 155 kW 2,0-litre direct injection petrol engine and a 70 kW electric motor. Parallel architecture means that the drive system is able to operate using petrol, electric or hybrid drive and can recover energy during deceleration. **e-tron** refers to technologies ranging from PHEV (Plug-in Hybrid Electric Vehicle) to range extenders and finally vehicles powered purely by electric batteries or fuel cells. An R8 e-tron will be released in limited numbers this year and Audi is testing smaller vehicles with an eye on production, starting with the A3 e-tron in 2014.

2013 SUBARU LEGACY

TAILORED TO FIT

Subaru's plan for its 2013 Legacy revolved around enhancing all areas of performance, from design to fuel efficiency, drivability and safety. Fuji Heavy Industries has implemented more extensive modifications than just a facelift (although there are styling revisions for China). Externally, the body is 6 cm higher and 4 cm wider, with 18-inch wheels. Under the bonnet, low- to mid-range torque has been boosted by adopting the new-generation Boxer engine and the second-generation Lineartronic CVT, above right, first used in the Impreza. That has helped improve both fuel-efficiency and engine output. Suspension revisions were aimed at improving refinement, with revised damper and spring rates and reinforcement of the vehicle body structure.

The Legacy's already excellent crashworthiness has been enhanced thanks to a bumper beam reinforcement and driver knee airbag. In addition to that, the Vehicle Dynamics Control gets a new control system.

SPORTS CAR SKIRMISH

2013 SUBARU BRZ

2012 MAZDA MX-5

Subaru claims its new BRZ is feathery light, quick off the line, and a better handler than just about any car this side of a Porsche Cayman – and does it all for (in the USA) around $25 000. In the sports car world, them's fightin' words. Because the MX-5 has been delivering sports car fans that same fun formula for the past 20 years, it was time for a showdown. We took both to the twisty roads deep in the Santa Monica Mountains to find out which is better. Can the Subaru outgun the benchmark affordable sports car? – *Ben Stewart*

The Miata is a classic convertible that looks to the past, aping the British roadster tradition of half a century ago, although our test car had the ingenious power-folding metal roof. The BRZ appears as though it's been rendered expressly for a starring role in *Gran Turismo 6*. It's also a four-seater, which is largely the reason for the 25 cm of length over the MX-5.

Even though these cars appear different, there are plenty of similarities. Both use 2,0-litre four-cylinder engines with six-speed manual transmissions, and both power the rear wheels.

On the inside, the Miata is like a snug-fitting T-shirt. The BRZ is roomier, and some will find it far more comfortable. The Subaru also has more headroom, comes with supportive STI-like seats, and has a fat steering wheel unmarred by stereo controls. You sit taller in the Mazda, and that creates an exceptional view of the car's corners – and the road ahead.

If you need to haul a lot of stuff in your MX-5, think again. It has no storage space behind the front seats, and the boot is a small 141 dm^3. The Subaru's more useful, and with the rear seats folded it can carry two golf bags or a full set of race tyres. But even though the BRZ has room for four, don't bother trying to sit back there unless you're of leprechaun proportions.

According to the spec sheets, the BRZ and the Miata are well matched, but on the road they have vastly different personalities. On a sunny day with the top down, there are few better places than the Mazda's cockpit. It's a little down on power compared with the BRZ, but that simply provides an excuse to frequently row the wonderfully mechanical shifter and keep the melodious motor at peak revs. The MX-5 dives into traffic gaps unsuitable for larger cars.

Likewise, the BRZ is an expert at the daily cut and thrust. The shifter requires a bit more effort, but it's so accurate you'll never flub a gear change. Like the Miata, the BRZ favors high revs. Although the exhaust note is a bit coarser, this engine freely spins to the lofty 7 400-r/min redline.

The MX-5's relatively soft suspension sucks up the worst potholes and rough road surfaces. The Subaru is firm – perhaps not exactly too firm, especially for true sports car nuts – but if our commute included lots of potholes, we'd grab the Mazda keys. Yet the BRZ is quieter and fits more stuff, so for a long road trip – especially one where mountain rides are involved – it's the easy choice.

Driving the MX-5 on canyon roads we got into a satisfying rhythm connecting the scintillating curves. There's such harmony between the driver and this chassis that it makes the car easy and fun to drive. But work it harder, to the edge of its abilities, and that balance goes away. The body rolls and bobs around on its suspension and the car becomes a little flustered. Although these two are nearly equal in a drag race, the MX-5 simply cannot catch the BRZ on a snaky road. The Subaru's firm suspension and robust chassis work together to make the car an animal in this terrain. The Subaru bends into a corner so aggressively and with such mastery that it almost makes it boring to drive at anything less than its limit.

If you do get into trouble, the stability control system responds instantaneously.

The system corrects any mistake quickly, then lets you get back to driving. The Mazda relies on older tech for its stability control, and it feels more intrusive.

But there are roads that perfectly fit the MX-5. On the tightest and roughest curvy road we could find, the Mazda's supple suspension handled the bumps that threw the BRZ off course. If the road is bumpy or undulating, the Miata's the master.

BOTTOM LINE

It's clear after a week of hard driving that the new Subaru BRZ is the more capable-handling machine. The BRZ is quicker in just about any situation, provides serious feedback for the driver, and is the ideal track-day partner. The Miata's not quite as sharp, but here's the caveat: its performance bandwidth is perfectly tuned for the normal below-the-limit driving we do most of the time. For a swift cruise down a country road, few cars can match the Miata's charisma. This one's a close call, but the Subaru wins.

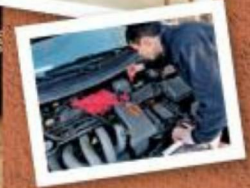
2013 Subaru BRZ	vs	2012 Mazda MX-5
150 kW, 205 N.m; 2,0-litre flat four/6M	< POWERTRAIN >	125 kW, 190 N.m; inline four/6M
2 570 cm	< WHEELBASE >	2 329 cm
4 234 cm	< LENGTH >	3 995 cm
1 253 kg	< WEIGHT >	1 180 kg
55/45	< WEIGHT DISTRIBUTION >	51/49
215/45R17	< TYRES >	205/45R17
	ACCELERATION (sec)	
2,4	< 0–50 km/h >	2,35
6,72	< 0–100 km/h >	7,06
17,53	< 0–160 km/h >	19,53
5,23	< 65–115 km/h >	5,62
15,03 at 150 km/h	< QUARTER-MILE >	15,25 at 144 km/h
	BRAKING (m)	
9,0	< 50–0 km/h >	9,1
36,6	< 100–0 km/h	37,1
	EPA FUEL ECONOMY	
9,8	< CITY >	11,2
7,9	< HWY >	8,4

DIY Handbook

Incorporating tools and commercial vehicles

FREE

Don't miss the July issue of Popular Mechanics and our new-look DIY Handbook, a practical and information-packed supplement featuring the best and most original hints from the magazine's back page, our top tool tips, our favourite DIY projects, the most relevant light commercial vehicle news, and more!



DO IT: Best DIY tips and household hints provided by you, our readers. Here you'll find useful how-to information of interest to everyone from the gardener to the home handyman, from the amateur mechanic to the DIY renovator.

BUILD IT: Step-by-step instructions for fun projects that can be completed in a day, or a weekend.

BUY IT: Our pick of the best and most useful tools for the home renovator and garage workshop.

USE IT: Practical hints on using power tools safely and effectively.

DRIVE IT: Choosing an entry-level light commercial vehicle: the options, the prices, the pleasures and pitfalls.

KEEP IT: So you've bought a bakkie. Here's how to protect your investment, and keep running costs down.

BROUGHT TO YOU BY

IN THE JULY ISSUE OF Popular Mechanics ON SALE 25 JUNE 2012

Mica Let us show you how

HARLEY-DAVIDSON SEVENTY-TWO

ALL CHOPPED UP

Despite its discreetly hidden fuel injectors, Harley-Davidson's Seventy-Two is still a defiantly anachronistic motorcycle. Using the decades-old Sportster platform with a 1,2-litre V-twin, the Seventy-Two evokes ornate styling elements from '60s-era choppers: a front fork raked to 30,1 degrees, towering 25 cm mini-ape handlebars mounted on a 5 cm riser and chopped fenders. Plenty of aftermarket accessories are available, including a sprung solo seat and a sleeker drag-style handlebar.

This air-cooled cruiser doesn't reinvent much of anything, but it certainly captures the imagination of chopper lovers who pine for the past – and is available at a reasonable price. Considering its lazy suspension geometry and intentionally unmodern mechanics, the Seventy-Two feels bicycle-thin and handles reasonably well. Our time spent cruising industrial back roads seemed especially well suited to the Seventy-Two; with its snappy bark and mellow vibe, the Seventy-Two charmed us into taking it easy. – *BASEM WASEF*

VOLKSWAGEN ECONOMY PARTS

KEEPING OLD FAITHFUL RUNNING

An older car may be cheaper to buy, but it isn't necessarily cheaper to maintain. Given the fast pace of automotive evolution, "older" may refer to a vehicle that is only a few years old. Precisely the kind of vehicle, in fact, that VW South Africa is targeting with economy parts.

Billed as affordable parts for Volkswagen models older than five years, they are specifically designed for passenger and commercial VWs out of warranty. They've been available to customers in Germany and some other key markets for some time and this offering is now available to customers in South Africa.

Some of the parts use simpler design and some are made out of alternative materials, allowing them to be made cheaper. However, VW emphasises that they maintain and offer the company's quality standards found in its full-price parts.

Currently offered as part of the Economy range are brake pads and discs, batteries, shock absorbers, CV joints, wiper blades and spark plugs.

TOYOTA PRIUS C

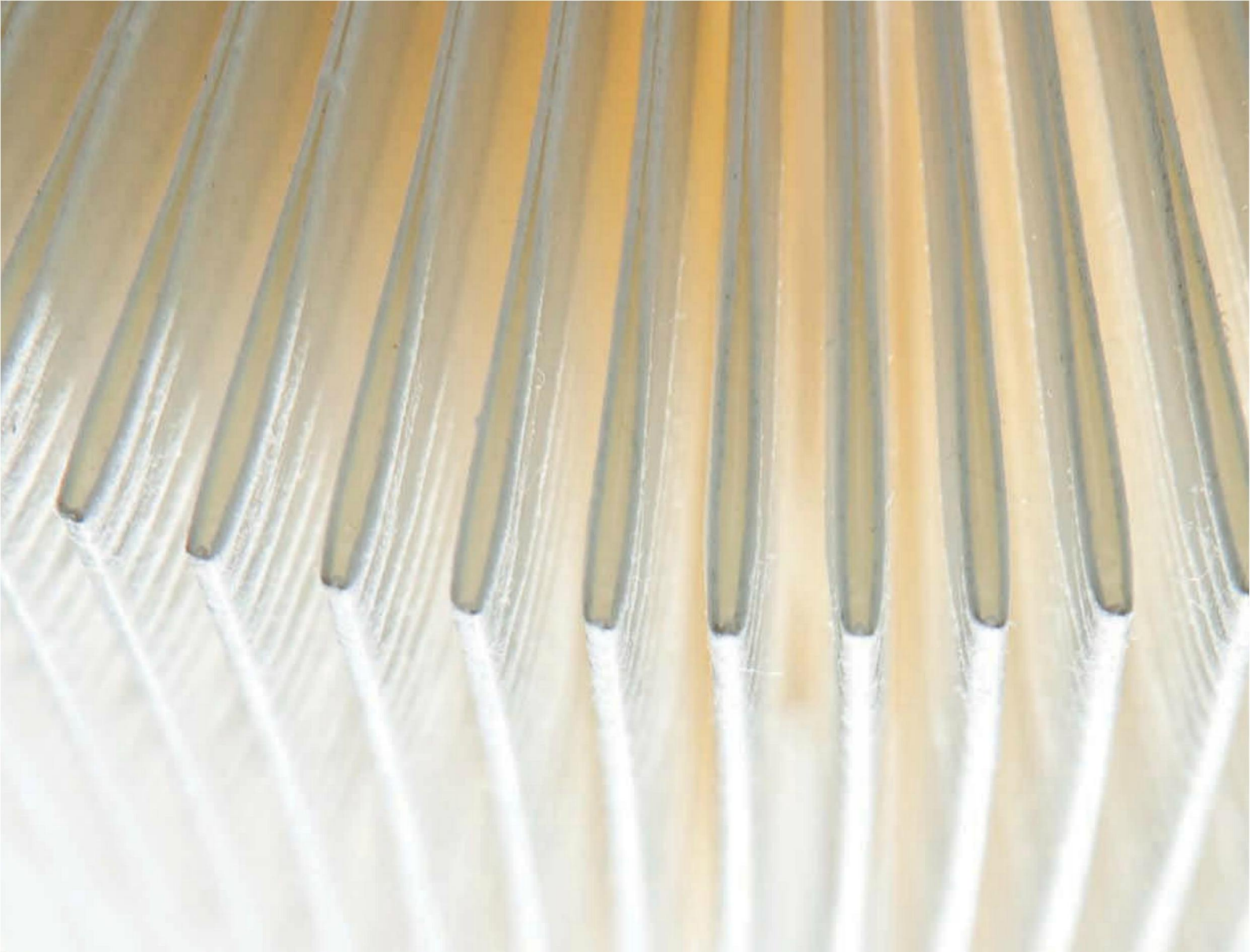
NOW IN LITE

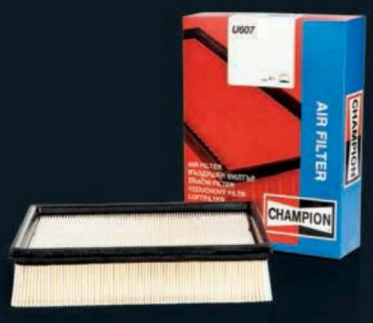
Toyota's grip on the hybrid market – the Prius nearly outsells all other hybrids combined – is about to get tighter. The latest Prius offspring is the "c", the smallest, cheapest and most efficient Toyota petrolelectric.

Based on the compact Yaris platform, the c relies on a downsized Prius powertrain. The petrol engine is smaller (1,5 litres instead of 1,8), as are the CVT and the nickel-metal-hydride battery pack. Consequently, the c is about 245 kg lighter than the regular Prius (now called the Liftback). Peak power, including the electric boost, is just 74 kW – enough to maintain highway speed, but it's leisurely off the line. The c is sufficiently nimble in tight urban confines, but it doesn't have the beguiling dynamics of, say, a Chevy Sonic.

For those who delight in monitoring fuel saved (the c is stellar in this regard), the trip computer provides plenty of entertainment. There are several ways to view efficiency, and drivers can even input fuel-economy data from other cars to obtain a real-time measure of litres and loot saved. Plus, the c is the first Toyota hybrid available with the cloud-based Entune mobile-app software. All of this gadgetry points to the fact that the joys of a Prius have little to do with actually driving it. – *Larry Webster*

PM





ALL THAT LIES BETWEEN YOU AND BETTER PERFORMANCE IS A PIECE OF PAPER

Ever wondered what keeps your engine really clean? Champion air filters have a tightly packed special paper ribbed design that removes 98% of all air contaminants such as leaves, dust and dirt. So the next time you wonder how you can keep your engine cleaner, and ensure better performance and longer engine life, choose Champion air filters **We've got the dirt**.

www.federalmogul.com

FEDERAL MOGUL

CHAMPION®

It's A Go | FMCF | 1827

Chuck Aaron (below right, with the author) modified a German BO-105 helicopter to perform unique aerial tricks.

Skids to the sky

PM'S REPORTER LOOPS AND ROLLS IN AMERICA'S ONLY AEROBATIC HELICOPTER.

> BY JEFF WISE
> PHOTOGRAPH BY TOM PATTON

We're in the front seat of a helicopter, thumping along 450 m above the foam-flecked waves of the Gulf of Mexico, when pilot Chuck Aaron does something you're never supposed to do. He pulls back on the controls and just keeps pulling. When the helicopter's nose rears up, I feel my body sinking into the seat as my heart crawls up my oesophagus.

We keep going until all I see is blue sky, then the line that separates it from the greener blue of the gulf. A little voice in my head is saying huuuunh? and the weight of an implausible yet true realisation sweeps over me: the rotors are now below us, the landing skids above. We are flying upside down.

There's a reason why you should never, ever fly upside down in a helicopter: the rotors will bend toward the skids and cut off the tail, and you'll plummet to your death. Helicopter rotors are designed to handle a lot of flexion, because each blade has to bend up and down as it moves into and against the slipstream. In normal flight, the blades bend away from the cockpit. But if you fly upside down, they flex in the other direction, giving a whole new meaning to the word chopper.

Aaron, a 63-year-old with a mane of golden hair and a bushy mustache fit for a circus ringmaster, knows all about this. He was a helicopter pilot and mechanic living in Camarillo, California, when he got a call from Red Bull in 2004. They'd heard that he'd assembled a US Army attack helicopter from parts scrounged on the open market. They asked him: could he build a helicopter capable of looping the loop? "No," he told them. It was impossible. End of story.

But Aaron kept mulling it over, and he thought that if you took the right kind of helicopter and modified it in just the right way, you might wind up with an aircraft that could fly upside down. Red Bull gave him the money, and he bought

a pair of German BO-105 helicopters with rugged one-piece titanium rotor heads and four short, stiff composite blades. After a year of modifications – he refuses to reveal the engineering details – he took his helicopter up.

Success did not come easily. For three months, Aaron got to know the machine, testing its capabilities. But fear held him back. "I'd get vertical and I'd chicken out," he says. "But over time I kept going a little bit further, and one day I pulled that sucker up and as I got to my chicken point, I did one of those instant things where I said, 'I'm going for it'. I pulled it straight back and I did the loop.

"As soon as I saw the ground, I was like, 'I can get this!'. So I pulled out of that and I did it again. I didn't want to forget how I did it. So I did it again and again – 10 times." From that first loop, Aaron expanded his repertoire of manoeuvres, and today he's the only civilian pilot in the US that's licensed to perform aerobatics in a helicopter.

It's a cold morning in Pensacola, Florida, when I meet up with Aaron. A big air show starts tomorrow, and with the 32 km/h winds, Aaron is debating whether to take part in the rehearsal. One time, he tells me, he almost killed himself trying to perform under similar conditions. This gives me pause, but Aaron assures me that we'll be fine if we go out over the water and try a few manoeuvres. So up we go.

We launch from the Naval Air Station's ramp and pass over the beach. Aaron climbs until he's above the barrier island that he'll use as a reference line to orient himself. Then he pulls up into the loop. In a matter of seconds we're over the top, then arcing downward. Aaron has discovered that this can be the most dangerous part. "If I keep it pointed down for too long, I'll build up too much airspeed," he says. "Then I'll have too many g's in the pullout and rip the transmission off."

That doesn't happen today, I'm pleased to report. Aaron once again pulls up into a climb, then startles me by rolling over to the left until our bodies are parallel to the horizon. He keeps rolling until we're upside down, then brings us back up the other side. In a plane, the equivalent manoeuvre would be a mild trick called an aileron roll; in a helicopter, the procedure causes a disconcerting sensation, as if someone were holding you by your heels over the edge of a tall building.

Next, Aaron pulls back on the stick and waits for his airspeed to bleed off until we're nearly dead in the air. Then he pushes the stick forward. We're floating in our seats in a low-altitude approximation of Nasa's Vomit Comet. A second later, we're toppling forward. As we fall straight down, Aaron rotates us 180 degrees on a vertical axis so our track is like the stripe on a barber pole, then pulls back so we level out.

He keeps stringing together one manoeuvre after another: up, sideways, down – whoop! I'm starting to think about a barf bag as Aaron pulls out of a climb and turns us into the wind. He's about to unleash the ultimate.

"Zero airspeed", he says, gesturing at the instrument panel. "This is the back flip."

He pulls back, and back, and back. I briefly have the sensation of climbing as the windshield fills with blue, and then the uncomfortable feeling of toppling backwards, falling upside down, hanging in my straps, a blur of disorientation. The helicopter has pivoted, heels over head, from a standstill – like a swimmer doing a back flip off a diving board. Then we're right side-up again, barrelling toward the shore below. My ears are filled with a piercing scream. It's coming from my own throat. It's a scream of pure, blind, mindless joy. PM

DIGITAL CLINIC Q+A

> BY JOHN HERRMAN

Name that sound

I keep seeing stickers from recognised audio brands on unrelated electronics. Does that mean these devices have premium sound, or is it just a marketing stunt?

A The badges are everywhere: on laptops, tablets and phones. Some from brands with real audio cred: Altec Lansing, Harman Kardon, Bang & Olufsen. Other brands are familiar, but mysterious – you may have heard

Picture by Philip Friedman

of Dolby, SRS and Creative, but do you know what they do? The explosion of celebrity-endorsed headphones has pushed product labelling to a new level, too. If you wanted, right now you could buy a Dr Dre-approved smartphone.

Gadget companies didn't invent this kind of branding, but they may have perfected it. Steve Guttenberg (no, not that one), who writes the popular audio-equipment blog *The Audiophiliac*, attributes this kind of branding to a sort of spec-sheet arms race. It's hard to stand out in a sea of similar devices, he says, so "everybody is trying to sell by adding features". Hence the over-the-top stickers, decals, and inscriptions.

Generally speaking, a device with special audio branding will sound different from an equivalent device without it. There's a good chance that it will sound noticeably better, too: Bass may be fuller, and highs a bit clearer. But what you're hearing isn't necessarily better hardware. Often, it's software.

There are certain limitations to designing an amp and a speaker system to fit inside a portable device, Guttenberg says, such as diminutive speaker size and extremely limited power supply (laptop speakers rarely exceed 5 watts). Most important, there's the issue of cost: a teardown of a typical R5 000 laptop leaves you with a bill of materials of about R3 500. Of that, less than R100 is spent on audio. (The small-quantity wholesale price on *alibaba.com* for a Realtek ALC268 audio processor and pair of laptop speakers comes to about R60.) Shifting that sum upward by a few rand, however, won't dramatically improve sound quality.

What you usually get when you buy a device with branded audio is special audio processing. Take, for example, the HTC Sensation XE, the first Android phone branded with Beats Audio. While the handset ships with better-than-average earbuds, its own audio hardware is undistinguished. The Beats Audio component of the phone is mainly software – in effect, an equaliser. The buds are nice, but they're an accessory.

That's not to say branded audio is something you should avoid – just that there usually isn't much hardware behind that sticker and it isn't worth paying extra for. With a little tinkering you can often reproduce "exclusive" audio-processing effects by adjusting the software equaliser in your music-player app of choice.

NEG-A-PIXELS

Q My friend told me that choosing a smaller picture size in my camera setting would result in cleaner, less noisy low-light photos. Is this true?

A Your friend is sort of right, but only in theory. Like film, a digital-camera sensor collects light. Unlike film, a camera sensor has to split that light into individual, discrete pixels. If you decrease the number of pixels that a sensor needs to create, it seems like more of the surface of the sensor could be devoted to each pixel. More surface area means more light absorption, which means better low-light photos.

Here's the thing: camera sensors are the number of megapixels of the photos they produce. Think of the pixels as little buckets: a 10-megapixel camera actually has 10 million of them, and they can't change size. Some pro-grade cameras can group clusters of pixels to achieve the effect your friend is talking about. But the majority of cameras, when turned to a lower megapixel setting, will either capture a full-resolution image and re-scale it or simply use less of the sensor. Different image-size options are included to save storage space, not to improve image quality. **PM**

Get your WISE experience

wise touch
"South African inspired"

Watch YouTube™ | Watch videos | Play games | Get educated | Explore & download apps | Send & receive e-mails | Read magazines | Facebook™ Twitter™ & Skype™ | Play music | Browse the internet | Use documents, spreadsheets & presentations | Take photos | Read books

A range of exciting accessories

Tel: 012 667 8888
www.wisetablets.co.za
info@wisetablets.co.za or
SMS 'Wise' to 45676 for more info

wise tablets

CONTRACT SPECIALS

WISE TOUCH TABLET 7" WI-FI
R119 Per month x12
Deposit R899
*Hardware Only
R1995 Cash price
WTG1-07W'

Wise Touch Tablet 7" Wi-Fi & Huawei E5832S 3G Portable Wi-Fi Hotspot
R169 Per month x12
Deposit R1999
R3389 Cash price

COM2012-1

Connect 5 Wi-Fi devices with this portable hotspot.
+ 3GB Data Bundle

Terms & Conditions apply | Prices are quoted VAT Inclusive
Prices valid while stock lasts | E & OE | Excludes delivery
Signing of 12 month contract subject to credit vetting

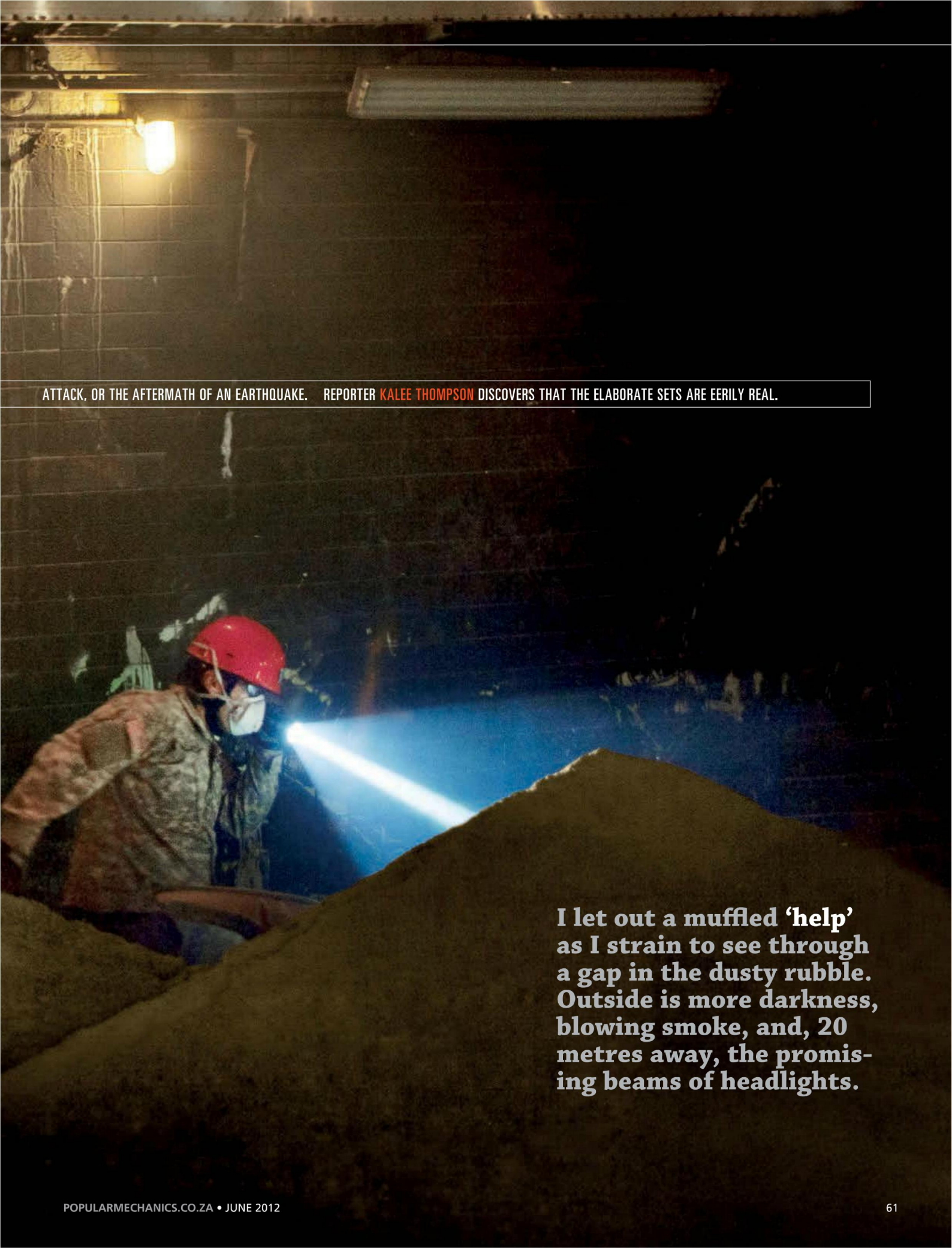
IN AN OLD TUNNEL IN WEST VIRGINIA, FIRST RESPONDERS TRAIN FOR THE WORST-CASE SCENARIO – WHETHER A HIGHWAY PILE-UP, A BIOCHEMICAL

Training day

In near darkness, an army reservist searches for "survivors" in a rubble pile crafted by trainers to resemble a collapsed parking garage.

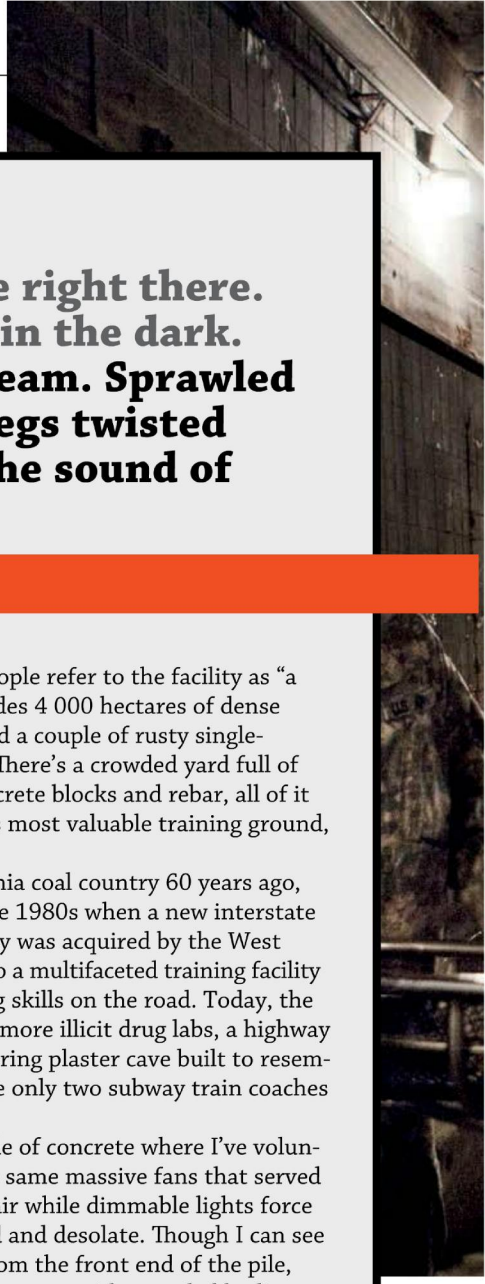
PICTURES BY JASON ANDREW

The rescuers are coming. For the past hour I've been pinned inside a tomblike cave of collapsed concrete, the result of a massive explosion in an underground parking garage. Finally, a voice echoes in the darkness: 'Can anyone hear me?'



ATTACK, OR THE AFTERMATH OF AN EARTHQUAKE. REPORTER KALEE THOMPSON DISCOVERS THAT THE ELABORATE SETS ARE EERILY REAL.

I let out a muffled 'help' as I strain to see through a gap in the dusty rubble. Outside is more darkness, blowing smoke, and, 20 metres away, the promising beams of headlights.



'Help,' I shout again. 'Over here.' 'Ma'am, we'll be right there. We're coming,' a young female voice bellows back in the dark. 'Is there anyone with you?' 'One, one more,' I scream. Sprawled out next to me in the dirt is a lifeless body, both legs twisted beneath it at impossible angles. In the distance, the sound of voices grows louder,

along with the growl of jackhammers and the crack of metal bludgeoning rock.

"All quiet," a voice suddenly cries out.

"All quiet," a chorus of several dozen repeats back in unison. Then, perfect calm.

"Ma'am, can you still hear us?" the young woman yells again, more clearly in the surrounding silence.

"My sister," I cry.

"Is your sister still alive?"

"I don't know," I scream.

"All right. Stay calm," she yells. "Ma'am, we're with the US Army Reserve. We're here to help. We're on our way!"

The smoke, the dust, and the screams are real, but my sister is actually a vinyl dummy; my rubble cave, part of a complex set. I'm at the Centre for National Response (CNR) in Gallagher, West Virginia, where rescuers train to respond to domestic disasters inside an abandoned highway tunnel. A wide array of trainees – from US National Guard, Coast Guard and Air Force teams to police officers, EMTs and firefighters – use the unique facility to learn to battle situations as diverse as earthquakes, terrorist bombings, train derailments, and highway accidents.

Today's students are military, members of the US Army's 300th Chemical Company. I've spent the past few days watching them train under the direction of Dave Underwood, a tall, even-tempered former fire captain. Soldiers like these probably won't be first on the scene in a big disaster, Underwood says, but they'll provide the manpower and equipment to push on after the capacity of local civilian first responders has been exhausted.

Although the military has dozens of specialised training grounds nationwide, none is as versatile as the CNR for preparing specifically for domestic catastrophes. During my time there, several people refer to the facility as "a Disneyland for first responders". The site includes 4 000 hectares of dense woodland that hide a mock crystal meth lab and a couple of rusty single-engined planes used to create crash scenarios. There's a crowded yard full of trashed cars and trucks and a mountain of concrete blocks and rebar, all of it tools for the centre's dozen trainers. The CNR's most valuable training ground, though, is the tunnel.

Chiselled into a mountain face in West Virginia coal country 60 years ago, the Memorial Tunnel was abandoned in the late 1980s when a new interstate highway was built nearby. In 2000, the property was acquired by the West Virginia National Guard and then converted into a multifaceted training facility with a staff that also takes its disaster-planning skills on the road. Today, the tunnel contains a mock train platform, several more illicit drug labs, a highway pile-up involving a jackknifed big rig, a meandering plaster cave built to resemble mountain hide-outs in Afghanistan, and the only two subway train coaches in the state.

At the far end of the tunnel is the hulking pile of concrete where I've voluntarily trapped myself. Smoke machines and the same massive fans that served the original tunnel blow damp waves of dusty air while dimmable lights force the rescuers to work in near darkness. It is cold and desolate. Though I can see groups of trainees slowly moving toward me from the front end of the pile, behind me is nothing but mountains of rubble strewn with mangled bodies. It's a carefully constructed landscape. "We can create any light setting that they want," Underwood says. "We can make wind. We can smoke the tunnel or put flame bars out. We can give them the realism that they need." Many of these soldiers have yet to see a war zone, never mind a major domestic disaster. The goal of the tunnel training is to get them as ready as possible for the real thing.

The army's chemical companies were formed during the first World War, charged with creating clouds of smoke to obscure troop movements and bridge construction and demolition – manoeuvres of conventional warfare that are now largely obsolete. ("The days of shooting rounds of mustard gas back and forth are over," one reservist tells me.) As of January 2011, most chemical companies were officially renamed CBRN companies – for chemical, biological, radiological and nuclear – and given a new mission: urban search and extraction. It's part of a large-scale effort to train military forces to respond to domestic "white missions", in addition to wartime "green missions".

"Our goal is to improve upon our civil support to local firefighters and emergency-response units in a time of need," Captain Whinston Antion says. "You're looking at soldiers going into collapsed structures, rescuing someone trapped in a building, cutting people out of vehicles." The 300th is the first chemical company to complete an intensive 10-week search and extraction

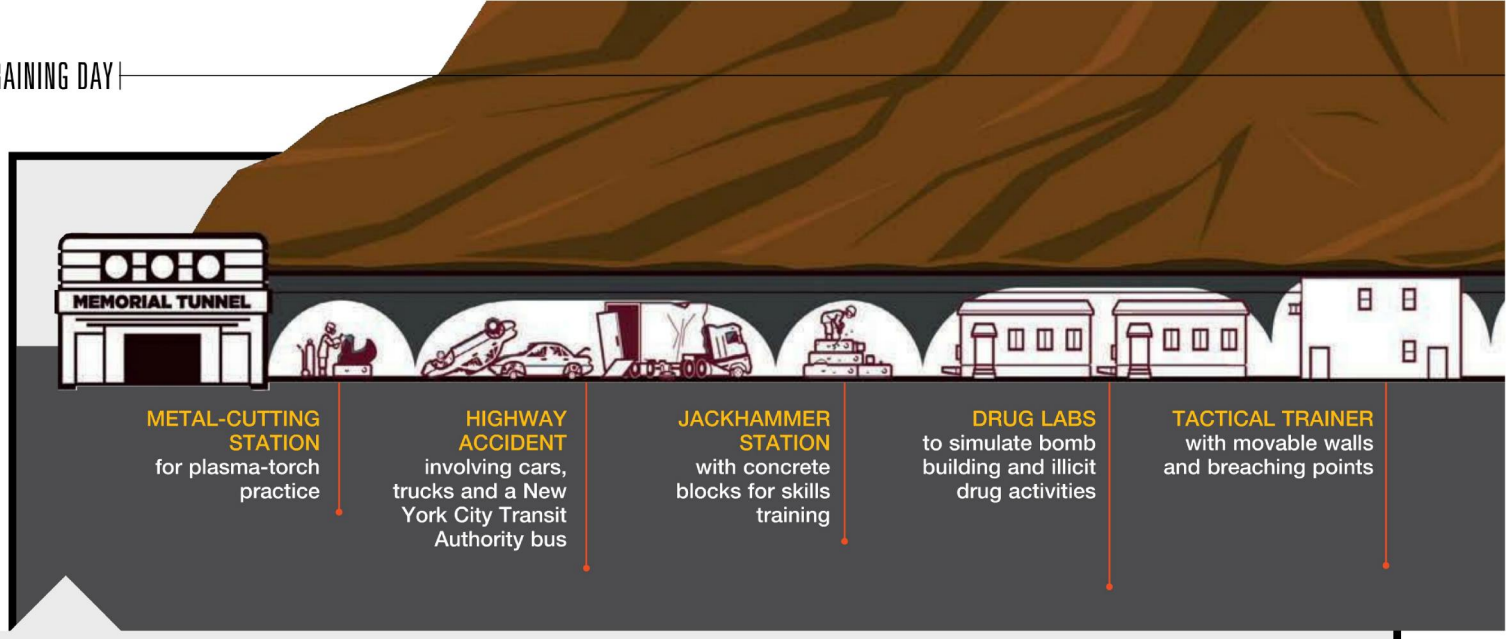
The rescuers-in-training secure a mannequin in a Stokes litter after extracting it from the rubble. To add even more realism, local people are sometimes hired to play the role of victim.

training. This week, three of its four platoons are reviewing and honing those skills. The fourth focuses its training on a more traditional chemical company mission: hazmat reconnaissance. "Its main mission is to identify what a potential terrorist is trying to cook up," Antion says.

The reservists' three-day session follows a "crawl, walk, run" format. On the first day I watch as a group of young soldiers practices roping and abseiling skills, which could be used to reach victims after a building collapse. One of the reservists helping to run the training is a baby-faced 21 year-old named James Hartman. As he spreads red climbing rope and carabiners across the roadway outside the tunnel entrance, Specialist Hartman describes how this training has helped him in his civilian job as a volunteer firefighter. He recently extracted a car-accident victim using the Jaws of Life and also just completed his first rope rescue: "It turned out it was for a dog – a Lab that was stuck on a cliff. I strapped him in and hauled him up," Hartman says.

By the afternoon, the soldiers are abseiling off the face of the three-storey tunnel. Given Hartman's obvious mastery of the climbing hardware and knots, I quickly agree to serve as a guinea pig for their mock rescue attempts. Hartman secures my harness and explains how I should keep my weight back and my feet planted against the wall as soldiers haul me up and over the lip of the tunnel's roof.

The next day I take a turn learning to slice through metal with a plasma torch, a tool whose safe use is demonstrated by a company member with a day job as a welder in a coal mine. The soldiers unpack brand-new axes, crowbars, and a 20-kilogram Jaws of Life metal cutter to rip apart a pile of crashed cars and extract the dummies that CNR staff have lodged inside. Terrorist attacks and natural disasters



Tunnel vision

First built for the West Virginia Turnpike, this 850-metre tunnel is now a versatile training ground for first responders.

can also lead to situations where people become trapped in their cars. "Peel it like a can!" Staff Sergeant Josiah Saxe yells as a couple of soldiers struggle to pry off the rear end of a blue sedan.

Dummies recovered, my group moves on to the last station, where each soldier inserts earplugs, pulls goggles over his or her helmet, and attacks a concrete rubble pile with a jackhammer. Meanwhile, the recon platoon, dressed in puffy hooded hazmat-protection suits and back-mounted oxygen tanks, practices chemical sampling in one of the tunnel's mock drug labs.

Compared with many of the groups that train in the tunnel, these soldiers are amateurs. Ninety per cent of the reservists have full-time civilian jobs; their normal commitment to the army is one weekend a month and one two-week training session a year. But with thousands of troops nationwide, the army chemical companies are poised to provide a lot of the muscle behind the broader military shift to white missions.

The US National Guard arguably plays an even bigger role. In the past few years, the Guard has built up 57 Civil Support Teams, new groups of 22 full-time soldiers wholly dedicated to domestic disaster response. Those teams

At the Centre for National Response, hazmat reconnaissance team members use an arsenal of handheld chemical detectors to identify airborne hazards.

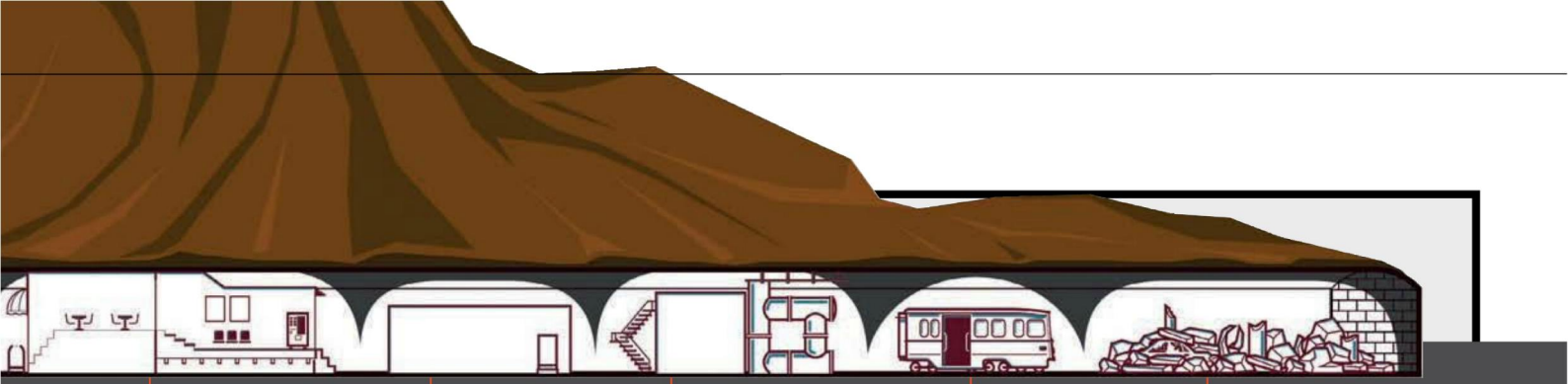


Illustration by DOGO

augment 17 larger groups known as CERFPs, each made up of approximately 180 part-time National Guardsmen. And as of last year, Homeland Response Force units, comprising more than 550 guardsmen, will serve each of the country's 10 Federal Emergency Management Agency (FEMA) regions. At a time when military budgets are shrinking, the shift represents a significant reallocation of resources.

The mandate to focus on domestic disaster was largely a reaction to 9/11. In the decade since, the reality has sunk in that these soldiers are more likely to respond to a natural catastrophe – or an accident. While at the tunnel, I hear references to Hurricane Katrina often. The devastating March 2011 Tohoku earthquake in Japan is on the trainers' minds, as are recent events close to home. Last year there were a record 14 US natural disasters that each caused more than a billion dollars in damage. Meanwhile, there hasn't been another significant domestic terrorist attack since 9/11.

The design of the final day's tunnel exercise ends up reflecting exactly this disconnect between expectation and reality. First the soldiers would be briefed on a massive explosion at the student centre at West Virginia State University in nearby Charleston. Just hours before, they'd be told, the university had denied a permit to a group of Islamic students who wanted to conduct a protest outside the building. Officials suspect a connection between the events. Midway through the exercise, the soldiers would receive new information: the local utility had determined that a massive gas-line leak was responsible for the devastation. There was likely no terrorism after all.

As Underwood and I climb into one of the CNR's four-wheelers and head toward the far end of the tunnel, he sounds more like a theatre tech than a fireman: "We'll start with an eerie glow and light smoke," he says, his bright red windbreaker luminous in the near-dark.

We reach the hulking rubble pile, representing a collapsed parking garage beneath the student centre. "The recon group will be semi-lit," Underwood says. "As the search and extraction teams arrive, we'll bring the lights up." Those power-tool skills are a little too new to attempt with headlights alone.

We stop the four-wheeler and I scale the jagged pile of concrete, pulling on a spare helmet and a pair of work gloves. Underwood points out a couple of safe hiding spots; I choose one and lower myself into it. I've been hidden for close to an hour by the time that first rescuer reaches me. I have already recognised the approaching voice as that of Sheena Tillman, a petite college junior with stick-straight posture and a focused gaze. She hands me a disposable paper mask through a break in the concrete, then a second one for my "sister". I lift the dummy gently from the dirt and snap the mask's elastic around its bald head. "We're gonna get you out, ma'am," Sergeant Tillman says, throwing down a small, pen-shaped chemical light.

Tillman has been in the reserves for five years. She hasn't been deployed. The tunnel, she'd told me earlier in the week, "is as close to real life as we can get so far." She keeps me talking as additional members of her platoon debate the best tool to break open my concrete cage. At first they seem intimidated by the task. I hear one soldier remarking on the massive weight of the concrete wall between us. Tillman jumps in to reassure me: "Ma'am, right now we're just assessing your situation. We're just looking for the fastest method to get you two out."

'Since 9/11, the reality has sunk in that these soldiers are more likely to respond to a natural catastrophe than a domestic terrorist attack.'

The soldiers decide to use a plasma torch to slice through a steel plate that abuts the concrete. There are groups of rescuers all around now, all struggling to extract one of the two dozen dummies hidden in the rubble. Even though many of the mannequins are decrepit, some with missing limbs, the soldiers have been instructed to assume they are alive. As the first spray of sparks bursts through the cracks in the wall, I shift away from the heat. It takes 15 minutes before the sheet of metal is pried back and the soldiers reach in, grab me under the arms, and pull me onto a waiting litter. Then they lift me up and carry me to safety. **PM**

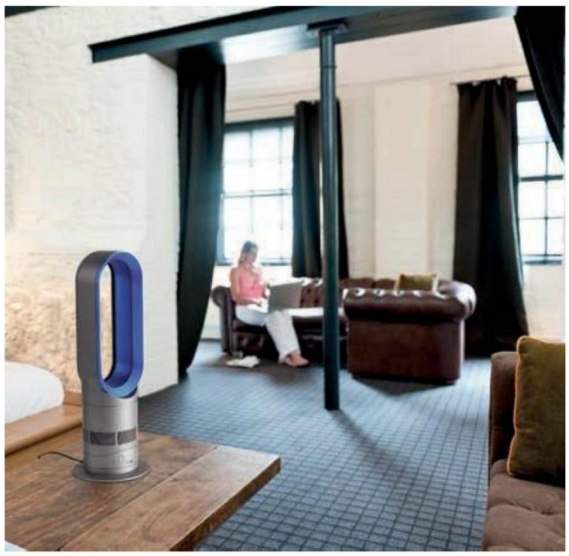
COMPILED BY THE EDITORS, *popularmechanics@ramsaymedia.co.za*

Hearth and home

Heating solutions with style

It's one of humanity's oldest challenges – how to keep warm when Earth tilts on its rotational axis during its year-long elliptical orbit around the Sun, exposing our hemisphere to a lower intensity of solar radiation and sending temperatures plummeting. In other words, with the coming of winter. Staying in bed and creating an artificial heat source are among the more obvious solutions – but what *kind* of heat? Here are a few ideas of note...

Goodbye, cold corners. Hello, Hot



Conventional heaters have limited settings. Like a watched pot that never boils, they can't always heat a whole room quickly. Meanwhile, central heating is wasted on the whole house when you need heat only one room. Enter the Dyson Hot, a radically different fan heater that's engineered to warm the whole room – and do it faster.

You can set the temperature at anything from zero to 37 degrees, and the Dyson Hot's "intelligent" thermostat will keep it there. The heater monitors the room temperature by measuring the surrounding air; if a drop is detected, it turns back on. Says inventor James Dyson: "Fan heaters rely on inefficient motors or dust-friendly grilles. As the heat rises, you're left with a partially heated room and a worrying burning smell. We've developed a heater that heats the whole room, without you having to constantly adjust the temperature."

It took 22 engineers – including experts in thermodynamics and fluid mechanics – over three years to research, develop and test Dyson's Air Multiplier technology for its application in a heater. Here's how it works: air is drawn in through a mixed flow impeller, a combination of the technologies used in turbochargers and jet engines. It is then accelerated through a 2,5 mm aperture set within the loop amplifier. This creates a jet of hot air that passes over an airfoil-shaped ramp that channels its direction. Surrounding air is drawn into the airflow, amplifying it six times in a process known as inducement and entrainment.

It's probably the safest fan heater you can buy – and the most expensive (it sells in the UK for the equivalent of about R3 400). The Dyson Hot has no visible heating elements, and its casing won't burn you. If it's tipped over, the machine will automatically switch off. If you're feeling lazy, you can use the remote control to turn the heater on or off, adjust the temperature, airflow rate and oscillation.

Sadly, the heater is not available in this country, although Dyson's iconic (and equally original) vacuum cleaner is catching on rapidly among well-heeled South African householders who appreciate good design.

DYSON HOT

Bling's the thing

The manufacturer calls it "the perfect marriage of Swarovski and Napoleon". We think they could have brought in the Liberace angle, but still, there's no denying that this is an eye-catching fireplace – and Napoleon is certainly a respected name in the home heating game.

What makes its LHD50 Limited Edition gas fireplace rather special is a bed of precision-cut Swarovski crystals, which reflect the flickering firelight to create a unique ambience. Helping this along is a bank of so-called "Crystalites" – little lights embedded beneath the ember bed that shine on to the crystals to enhance the display. Among the other features are a chrome bevelled door frame, electronic ignition with battery back-up, 50 per cent flame/heat adjustment for maximum comfort and efficiency, and hand-held remote for controlling the flame and lights.

According to the manufacturer, the fireplace is approved for bathrooms, bedrooms, bedsits and mobile homes. Seriously.

NAPOLEON LHD50 LIMITED EDITION GAS FIREPLACE

Focus on beauty

Ever heard of Pulchra? It's the first "beauty contest" reserved for objects. Launched in Italy five years ago by renowned architect Sandro Silvi, the competition aims to present to the public, each year for 10 years, 100 objects carefully selected for their beauty by a committee of experts, including architects and designers.

In the course of a year, the most beautiful of these is chosen via an Internet vote that's open to all. The 10 winning objects are then placed in a waterproof metal capsule and buried in a specially designated area of a park in a different city each year – a treasure destined for future archaeologists.

Three years ago, this fireplace was voted one of the 10 most beautiful objects in the world – and it's not hard to see why. The Gyrofocus, designed by award-winning contemporary fireplace maker Focus, won the highest number of votes in the inaugural Pulchra design competition. Created by Dominique Imbert in 1968, it beat objects ranging from a television designed by Philips to a Sony Ericsson mobile phone, from creations by Philippe Starck to a Leo Cut diamond. Message: design classics never grow old.

GYROFOCUS

ZERO WOOD BURNING

Baby, it's warm outside

Meet the Zero wood-burning fireplace from Beauty Fires. If you're looking for a stylish focal point at your next patio party and don't want your guests to turn blue while they're waiting for their canapés (it's winter, remember), the Italian-designed Zero fireplace by Beauty Fires could work for you.

It comes with a lid that shuts off the combustion chamber in the event of rain, and storage space around the chamber for enough wood to last the evening (and beyond). It is supplied in two sizes and in ready-to-assemble kit form. Prices on request from Beauty Fires; e-mail *info@beautyfires.com* or call 011-262 0258. **PM**

One really good idea

iStockphoto/N_design

THAT'S ALL IT TAKES to enter our competition and stand a chance of becoming South Africa's **Inventor of the Year** for 2012. In the coming weeks and months, we'll be calling for entries from all corners of the country as we prepare for our annual feast of inventive excellence in four categories: **Stepping Up** (high schools), **Breaking Ground** (university students), **Emerging Genius** (previously disadvantaged and minimally resourced entrants) and **Cutting Edge** (open to anyone).

Generous prizes are on offer in each category, and the overall winner will be declared South Africa's **Inventor of the Year** for 2012, walking off with a floating trophy plus a large cash prize in recognition of his or her achievement.

As before, the competition forms part of a larger initiative that encompasses an inspiring conference – expect something very different this year – plus a mini-expo of cool technology and the chance to mingle with some of the smartest people you'll ever meet. Oh, and did we mention that prize money would be generous? We'll be releasing full details in the near future.

Rules? There are a few, but we'll do our best to make it as easy as possible. For example, your invention must be your own, original work, and it must be fresh (in other words, don't submit something that was featured in your local newspaper 20 years ago). It should also serve a genuine purpose: whereas you might believe a combination nose-hair clipper and tea strainer is exactly what the world needs, you're probably wrong. And finally, keep it real: your rough sketch of a fusion-powered bicycle won't cut it.

What's your next move? Start working on that invention right now – and *do your homework*. Research it on the Web to make sure your invention isn't replicating someone else's idea (you'd be surprised), gather all the relevant information on your target market, and if possible, build a working prototype (there's nothing quite as reassuring to a judging panel as an invention that clearly works). Then, when we open for entries, you'll be ready and waiting. For more information on entries and the "rules of engagement" (for example, keep it fresh and original), please visit our Web site at *www.popularmechanics.co.za* or e-mail Nomfundo Calana at *nomfundoc@ramsaymedia.co.za*

STEPPING UP | **BREAKING GROUND** | **EMERGING GENIUS** | **CUTTING EDGE**

Gauteng-based LaserX staged a spectacular display of animated graphics for the awards ceremony marking the finale of 2011's Popular Mechanics Inventors Competition. Expect something equally provocative at this year's event. At last year's ceremony, Cape Town bioengineer Dr George Vicatos was named Inventor of the Year for his role in the development of a versatile and potentially life-changing facial reconstruction system.

SA: gadget nation

Getting connected is becoming easier day by day. But as you rush to take advantage of Internet-ready devices, beware the cyber crooks lurking in the shadows.

The average South African family with an Internet connection has four personal electronic devices with Internet access and massive data-storage capacity.

And that's only the average. There's a small, but fast-growing elite, the 2,6 per cent of "highly connected" South Africans who own today's gadget equivalent of poker's full house: desktop PC, laptop, smartphone and tablet.

We're well up among the 20 countries and 7 000 respondents surveyed during 2011 for top antivirus company Kaspersky Lab.

But that connectivity comes at a potential cost: even as new elite revel in their super-capable gadgets, they're opening themselves up to the risk of cyber crime, says Kaspersky.

We're not far behind the world's most gadget-happy nation, Saudi Arabia, which averages 4,3 devices per household. At the other extreme is Romania, on just 2,6.

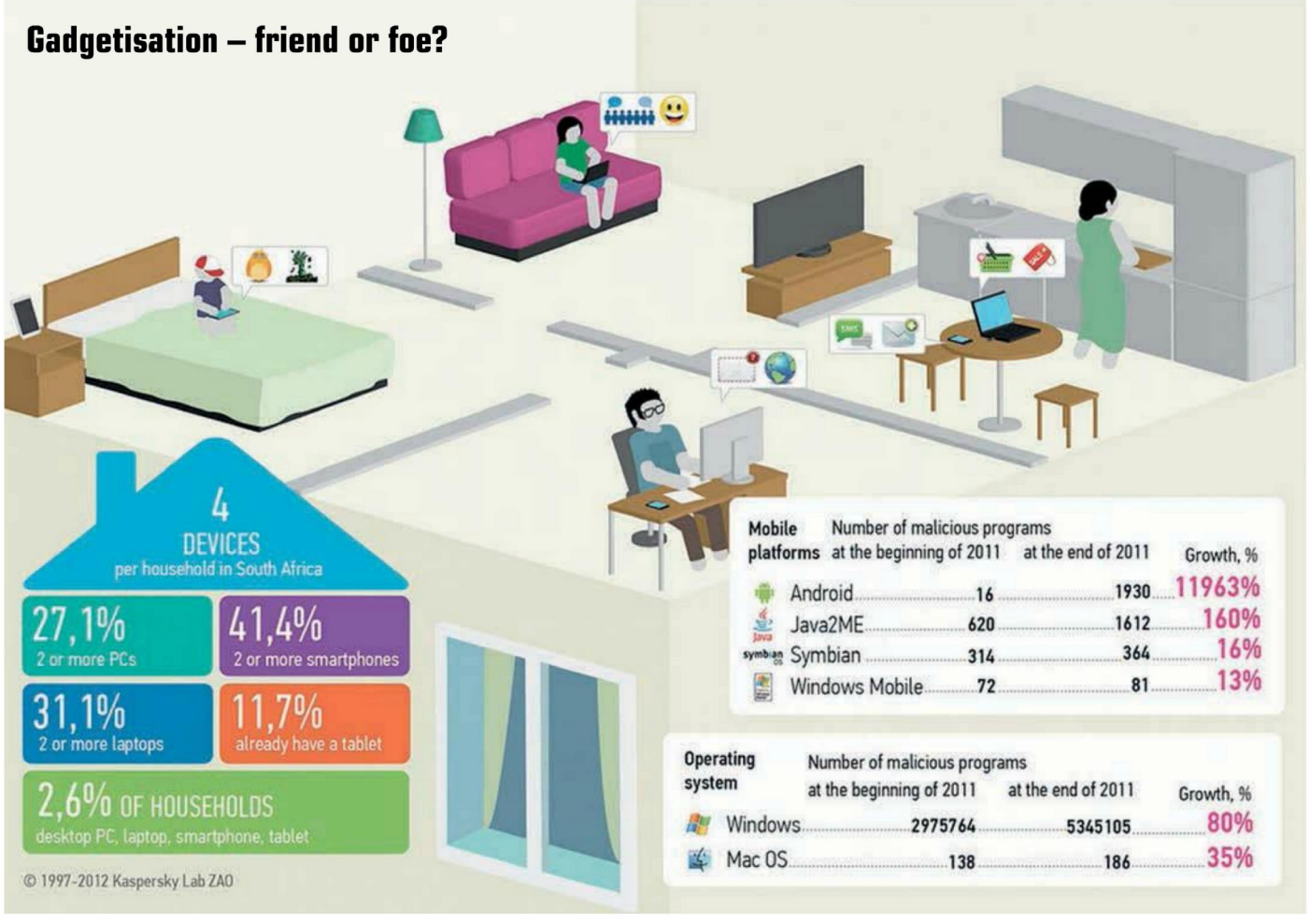
So what are these devices? Smartphones, mainly: two out of every five households surveyed report having at least two smartphones. Add to that 27,1 per cent of the respondents with two or more desktop PCs, with slightly more having two or more laptops at home. Tablets may be slow to take hold, but when they do... watch out. Currently just under 12 per cent of respondents have one.

We're under increasing threat as online activity becomes an everyday occurrence, as social networks take up increasing chunks of our time and as we spend more time checking mail or browsing the Net. You don't need a conventional computer for this, either: a smartphone will do.

In 2011, the experts at Kaspersky Lab observed a dramatic growth in the amount of malware for the majority of platforms. On Windows, the default operating system on most of the world's PCs, malware increased 80 per cent last year. Think you're immune on a Mac? Think again: malware aimed at Mac OS grew 35 per cent.

It's the mobile platforms that should really have us worried. The runaway success of Android as a mobile platform has been mirrored by a similar ballooning of threats. A year ago, there were barely a couple of dozen threats; by the end of 2011, the

Gadgetisation – friend or foe?



Mobile platforms	Number of malicious programs at the beginning of 2011	at the end of 2011	Growth, %
Android	16	1930	11963%
Java2ME	620	1612	160%
Symbian	314	364	16%
Windows Mobile	72	81	13%

Operating system	Number of malicious programs at the beginning of 2011	at the end of 2011	Growth, %
Windows	2975764	5345105	80%
Mac OS	138	186	35%

total breached the 2 000 mark. The overall increase in malware targeting Android for the year came to almost 12 000 per cent.

You shouldn't feel too smug if you're using the alternatives. Windows Mobile viruses grew 13 per cent and Symbian 16 per cent. Java2ME is used on the majority of basic phones – so naturally it's a favourite target for virus writers, who boosted their output on this platform by 160 per cent.

"Regardless of the type of device or operating system, users need to be sure that all their gadgets are protected. With such a variety of devices and platforms, comprehensive protection is only possible with the help of universal solutions that have already become a major new trend in IT security for end users," says Alexander Erofeev, Kaspersky's head of strategic marketing and brand communication. "When you have several devices, purchasing an integrated solution makes more sense economically than protecting each device separately, and it makes installation much easier." Naurally, he pointed out the company's ONE system as "just the sort of flexible solution that can protect your PCs, laptops, Macs, smartphones and tablets".

Small outfits head for the cloud

If you're planning to make a success of your small business, you'd better have your head in the cloud. In fact, you are probably already using the cloud without even being aware of it: hosted e-mail, hosted mobile messaging services such as BlackBerry's BBM, Dropbox... they're all in the cloud.

Within the next two years, cloud computing is set to grow even bigger and to transform the way that small South African businesses consume ICT services, is the word from Nashua Mobile.

In the past, we've been hampered by local broadband's erratic quality and high price. That's changed thanks to innovative and affordable data products such as uncapped ADSL products.

What's the big deal about the cloud?

For a small business, cost is a huge inhibiting factor: it simply can't afford the cost of technology applications. But the cloud would give access to tech applications as online services provided by telecommunication service providers. No need to install applications on PCs and servers, and payments per-user, per-month.

It isn't just about cost, either. The cloud adds improved operating functionality and flexibility. You can scale up or down as required.

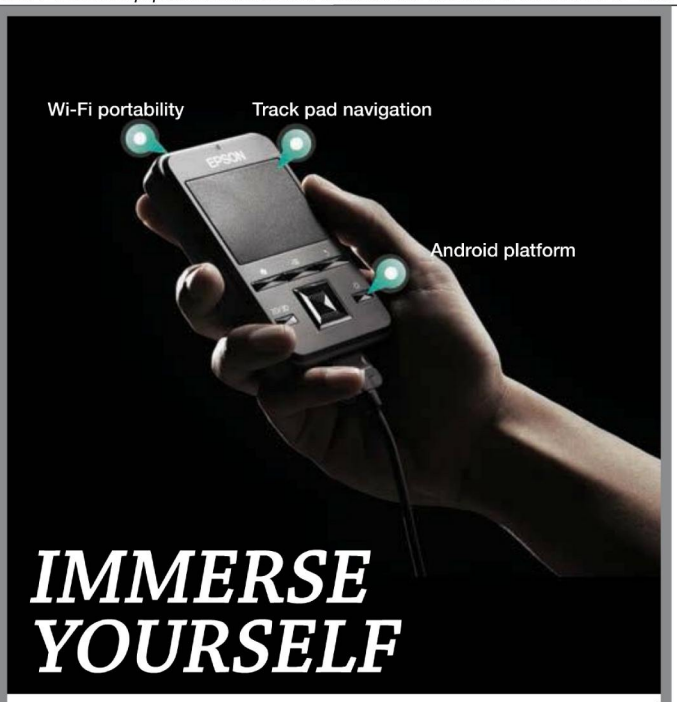
That will entail moving beyond the basic cloud applications mentioned earlier to bigger, more complex business and even telecoms applications. That, in turn, will cut down costs on a range of areas from IT support to internal staff or service providers.

Another plus is how neatly the cloud approach dovetails with the growing tendency towards remote and mobile work – work-shifting. There's secure access to applications and data stored in the cloud from anywhere in the world. Your office is wherever you are.

Nashua Mobile believes that cloud computing will become mainstream in the SMME market within the next year and is working to offer a range of hosted products in the second half of 2012. According to market researcher, IDC, 63 per cent of South African organisations are already investing in some form of cloud technology or plan to do so in the near future.

With mainstream software vendors like Microsoft aggressively pushing the cloud, Nashua is convinced it will be the computing model of the future.

VIDEO > Visit *www.popularmechanics.co.za* to view a video demonstration of Microsoft's cloud applications



IMMERSE YOURSELF

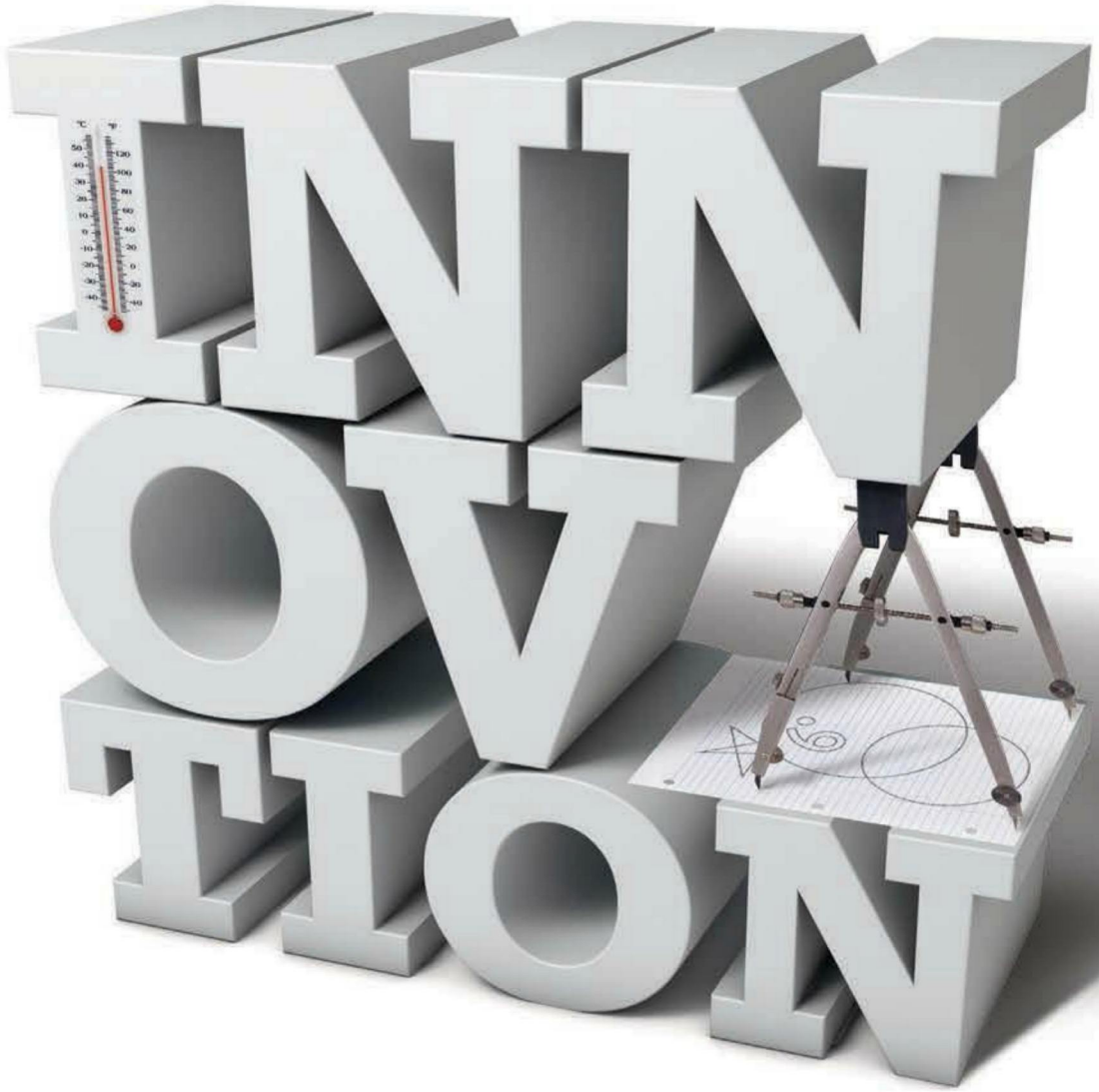
The future meets reality with the help of a nifty device called Moverio BT-100, Epson's newest venture in personal technology. Its high-res see-through display, Wi-Fi connectivity and smart navigation capabilities create an innovative visual experience, the portable controller and headset allowing you to browse, shop and stay connected without disconnecting from your environment.

It runs on an Android 2.2 platform with Adobe Flash 11 support, streaming content from your favourite flash-based Web sites via a Wi-Fi connection. You can access content from a variety of sources, including the built-in gallery and music apps, and the system is easily updated with new apps, new content and new ideas. Flip easily from the interactive trackpad for games to text mode for communicating with friends, or take a virtual tour of the French Riviera during your lunch break.

Imagine playing an online flight simulation game one minute and the next minute, flying a drone plane while simultaneously viewing the live video feed from the drone's cameras – projected in front of your eyes as a 200-cm perceived image. Starting to get the picture?

Oh, and the Moverio goes where you go, thanks to Wi-Fi connectivity and a compact touch-sensitive rechargeable controller providing nearly 6 hours of battery life. So you can stream videos from YouTube, listen to music, check your e-mail, play games, book tickets or research new restaurants from virtually anywhere. Even when you aren't connected, the microSDHC card slot (4 GB card included) and internal 1 GB user storage on the controller provides easy access to downloaded content. When it's time to relocate, you simply slip the glasses back into the carrying case.

• It's available through *Amazon.com* for around R5 500. Go on – it's only money. **PM**



Did you know that facing RDP houses north could save energy while pushing the room temperature up by 6 degrees in winter?

Well, that was one of the innovations at the *eta* Awards last year. Show us your bright new idea and how it saves energy, and you could win R30 000 in cash. The *eta* Awards recognises and rewards innovative energy saving ideas from homeowners, children and small companies, all the way to big corporates.

To find out more, visit: www.eta-awards.co.za

CATEGORIES	
Industrial	Commercial
Young Designers	Innovation
Residential	Energy Efficiency Awareness
Efficiency Champion	Community Projects
Energy Savings in Households	Energy Efficient Lighting Design www.lighting-design.co.za

ENTRIES OPEN ON 2 APRIL 2012 AND CLOSE ON 3 AUGUST 2012

eta awards
TURNING IDEAS INTO ENERGY
Sponsored by Eskom

energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

Sponsored by
Eskom
www.eskom.co.za

SOCIAL MEDIA FAUX PAS

As a regular (perhaps harmlessly obsessive?) social media communicator, you may think you know the rules of engagement. But do you really?

BY RICHIE FRIEMAN

EACH MORNING, millions of Facebook fans wake up to see what their closest 800 friends have done since last night. Did someone get a new job? Get engaged? Join Bieber-Nation? Let's make one thing perfectly clear, folks – Facebook is public. If you post your e-mail address, expect to be e-mailed. If you post a photo of yourself, don't be upset if someone comes across it.

Think of Facebook as a giant party with everyone you know in attendance – and every time you post something, it's as if you just hopped up on stage and announced it to the room. There are only two ways this can go down. One, you say something nice and polite like, "Thanks for an amazing day with terrific friends." Or two, you idle up on stage, tripping over your feet like a drunken groomsman, and tell the crowd what really happened at the bachelor party. To avoid becoming that drunken groomsman, here are my top Facebook faux pas to avoid.

FACEBOOK FAUX PAS #1: THE OPEN-ENDED STATUS

Ever read someone's status and it leaves you with more questions than the final episode of *The Sopranos*? Here is a recent status update from a friend of mine: "Ken Harmon is well, you know."

No, I don't know? *Should* I know? Should I be worried? Am I supposed to guess? Are you "Well, you know, driving to Mexico at 2 am?" Are you "Well, you know, hanging off a cliff", and need a hand? Or are you "Well, you know, trying to get rid of that 62-inch plasma TV"? Because if that's the case, I am happy to take it off your hands. Fill me in!

Don't leave a message that makes your friends scratch their heads and wonder. Doing so is an obvious cry for attention, and although Facebook has given us the opportunity to immediately communicate with all of our closest friends and family, this just isn't the place or the method. An open-ended status is a little like when you see someone staring at you with a sad face, and when you ask them what's wrong, they say, "Oh, nothing". Avoid it at all costs.

FACEBOOK FAUX PAS #2: THE INSENSITIVELY TIMED UPDATE

People tend to forget that Facebook is date and time stamped (to the minute). This never works when, say, you are supposed to be watching your buddy's concert but are instead posting a status update about your team's overtime win. All of the goodwill you built showing up and complimenting said friend on his skills will be completely wiped out the next day when he sees your update came at the same time as his drum solo. It's bad manners to go on Facebook when you should be focusing your attention elsewhere. And if you're going to do so, at least have the courtesy to keep your rudeness a secret.

FACEBOOK FAUX PAS #3: THE RUDE DATE STATUS

This next one takes the cake. Last week, my friend Rachel had a rather uneventful date. Her first mistake was forgetting that the night before, she had accepted her date's friend request. Her second was posting a status, during the cab ride home, saying "Hardly a Mr Right – more like a Mr Has No Chance Of A Second Date! LOL!". Nice, right? Later that night, this guy finds out from Facebook that not only would Rachel not be returning his call, but even worse, she topped it all off with an "LOL" at the end! The ultimate in humiliating endings to a date.

Don't use Facebook to diss your date, or anyone else; it's simply not good manners. And following this manners rule might save you some humiliation – you never know who in your network might be connected to the dissee.

FACEBOOK FAUX PAS #4: BREAKING UP ON FACEBOOK

The evil step sister to #3, nothing says rude beyond words like breaking up with someone on Facebook. A Facebook break-up by far trumps texting for the pure public humiliation factor. Texting at least has some privacy to it. On Facebook, however, when someone changes their status from "In a Relationship" to "Single", all of their friends are notified. Ouch.

There is only one way to break up with someone: in person. Period.

iStockphoto/Michele Principalli

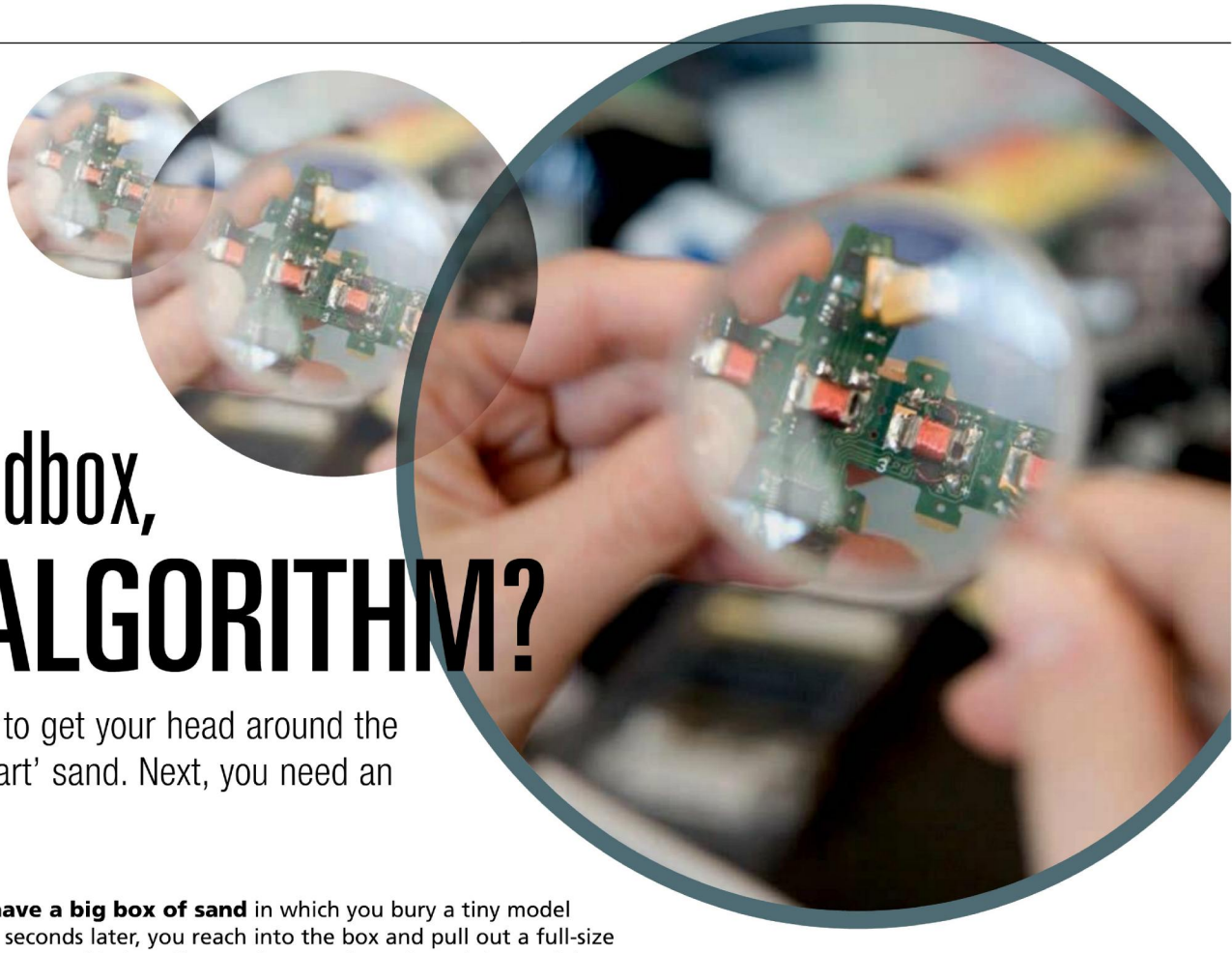
FACEBOOK FAUX PAS #5:
TASTELESS PHOTO TAGGING

Maybe it was a great night out, a perfect holiday party or a perfect beach day with the family – nothing holds sweet memories like a nice photo. And nothing can completely ruin your day like seeing a photo of yourself, well, let's just say, not in your finest moment.

We all have one Facebook "friend" who arrived seemingly out of nowhere. His friend request appeared in your In box one fine morning and you think, "Well, time has passed; they've matured, why not?". But next thing you know, you're tagged in a photo from *that* embarrassing staff year party 10 years ago.

Okay, at the time, singing 14 choruses of *Hey Jude*, six margaritas deep at the Fat Cactus, seemed utterly hilarious. But now, when you are trying to establish yourself as a responsible executive, reliving that moment – in public – is not quite so hilarious. The answer: kindly *untag* and then *unfriend*. No matter how funny it may seem, never tag – or post – an unflattering photo of someone else. When in doubt, ask first.

● Richie Frieman writes the *Modern Manners Guy* column for *Quick and Dirty Tips*, where this article first appeared. **PM**



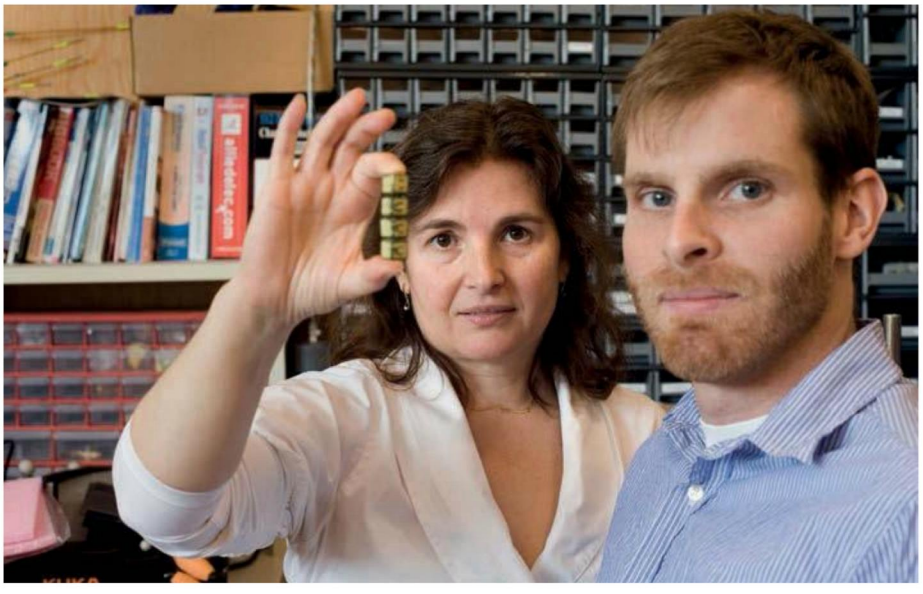
My sandbox, MY ALGORITHM?

First, you need to get your head around the concept of 'smart' sand. Next, you need an algorithm...

Imagine that you have a big box of sand in which you bury a tiny model of a footstool. A few seconds later, you reach into the box and pull out a full-size footstool: the sand has assembled itself into a large-scale replica of the model.

This may sound like a scene from a Harry Potter novel, but it's the vision animating a research project at the Distributed Robotics Laboratory (DRL) at MIT's Computer Science and Artificial Intelligence Laboratory. At the IEEE International Conference on Robotics and Automation last month – the world's premier robotics conference – DRL researchers presented a paper describing algorithms that could enable such "smart sand". They also described experiments in which they tested the algorithms on somewhat larger particles – cubes about 10 mm to an edge, with rudimentary microprocessors inside and very unusual magnets on four of their sides.

Unlike many other approaches to reconfigurable robots, smart sand uses a subtractive method, akin to stone carving, rather than an additive method, similar to snapping LEGO blocks together. A heap of smart sand would be analogous to the rough block of stone that a sculptor begins with. The individual grains would pass messages back and forth and selectively attach to each other to form a three-dimensional object; the grains not necessary to build that object would simply fall away. When the object had served its purpose, it would be returned to the heap. Its constituent grains would detach from each other, becoming free to participate in the formation of a new shape.



Distributed intelligence

Algorithmically, the main challenge in developing smart sand is that the individual grains would have very few computational resources. "How do you develop efficient algorithms that do not waste any information at the level of communication and at the level of storage?" asks Daniela Rus, a professor of computer science and engineering at MIT and a co-author on the new paper, together with her student, Kyle Gilpin.

Above: To test their algorithm, the researchers designed and built a system of "smart pebbles". Left: To attach to each other, to communicate and to share power, the cubes use "electropermanent magnets", materials whose magnetism can be switched on and off with jolts of electricity.

If every grain could simply store a digital map of the object to be assembled, "then I can come up with an algorithm in a very easy way", Rus says. "But we would like to solve the problem without that requirement, because that requirement is simply unrealistic when you're talking about modules at this scale." Furthermore, Rus says, from one run to the next, the grains in the heap will be jumbled together in a completely different way. "We'd like to not have to know ahead of time what our block looks like," she says.

Conveying shape information to the heap with a simple physical model – such as the tiny footstool – helps address both of these problems. To get a sense of how the researchers' algorithm works, it's probably easiest to consider the two-dimensional case. Picture each grain of sand as a square in a two-dimensional grid. Now imagine that some of the squares – say, in the shape of a footstool – are missing. That's where the physical model is embedded.

According to Gilpin, the grains first pass messages to each other to determine which have missing neighbours. (In the grid model, each square could have eight neighbours.) Grains with missing neighbours are in one of two places: the perimeter of the heap or the perimeter of the embedded shape.

Once the grains surrounding the embedded shape identify themselves, they simply pass messages to other grains a fixed distance away, which in turn identify themselves as defining the perimeter of the duplicate. If the duplicate is supposed to be 10 times the size of the original, each square surrounding the embedded shape will map to 10 squares of the duplicate's perimeter. Once the perimeter of the duplicate is established, the grains outside it can disconnect from their neighbours.

Rapid prototyping

The same algorithm can be varied to produce multiple, similarly sized copies of a sample shape, or to produce a single, large copy of a large object. "Say the tie-rod in your car has sheared," Gilpin says. "You could duct-tape it back together, put it into your system and get a new one."

The cubes – or "smart pebbles" – that Gilpin and Rus built to test their algorithm enact the simplified, two-dimensional version of the system. Four faces of each cube are studded with so-called electropermanent magnets, materials that can be magnetised or demagnetised with a single electric pulse. Unlike permanent magnets, they can be turned on and off; unlike electromagnets, they don't require a constant current to maintain their magnetism. The pebbles use the magnets not only to connect to each other, but also to communicate and to share power. Each pebble has a tiny microprocessor that can store just 32 kilobytes of program code and has only two kilobytes of working memory.

The pebbles have magnets on only four faces, Gilpin explains, because, with the addition of the microprocessor and circuitry to regulate power, "there just wasn't room for two more magnets". But Gilpin and Rus performed computer simulations showing that their algorithm would work with a three-dimensional block of cubes, too, by treating each layer of the block as its own two-dimensional grid. The cubes discarded from the final shape would simply disconnect from the cubes above and below them as well as those next to them. Simple, right? PM

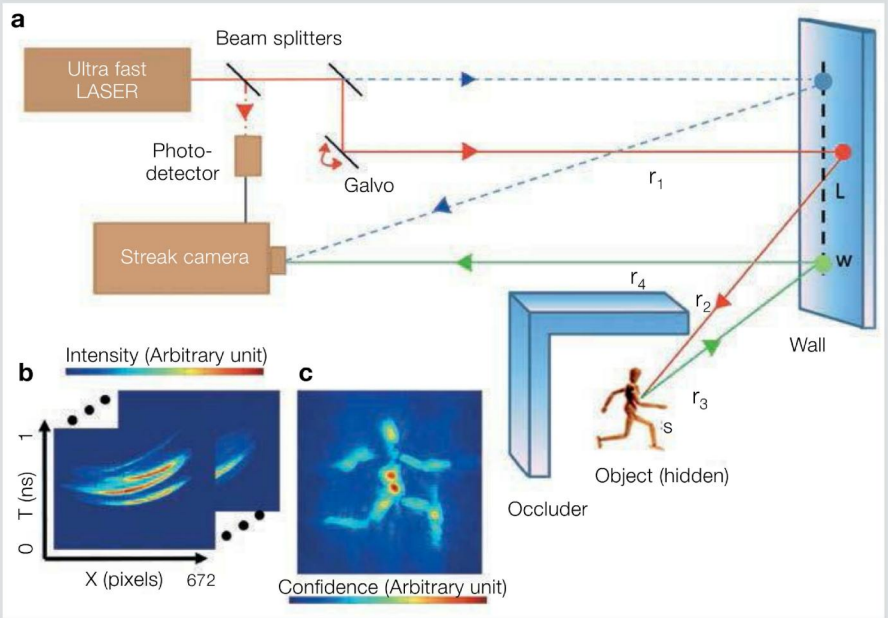
ROUND-THE-CORNER CAMERA

MIT Media Lab researchers caused a stir a few months ago by releasing a slow-motion video of a burst of light travelling the length of a plastic bottle. But the experimental set-up that enabled that video was designed for a much different application: a camera that can see around corners.

In a paper published in the journal *Nature Communications*, the researchers describe using their system to produce recognisable 3-D images of a wooden figurine and of foam cutouts outside their camera's line of sight. The research could ultimately lead to imaging systems that allow emergency responders to evaluate dangerous environments or vehicle navigation systems that can negotiate blind turns, among other applications.

The principle behind the system is essentially that of the periscope. But instead of using angled mirrors to redirect light, the system uses ordinary walls, doors or floors – surfaces that aren't generally thought of as reflective. The system exploits a device called a femtosecond laser, which emits bursts of light so short that their duration is measured in quadrillionths of a second.

To peer into a room that's outside its line of sight, the system might fire femtosecond bursts of laser light at the wall opposite the doorway. The light would reflect off the wall and into the room, then bounce around and re-emerge, ultimately striking a detector that can take measurements every few picoseconds, or trillionths of a second. Because the light bursts are so short, the system can gauge how far they've travelled by measuring the time it takes them to reach the detector. The system performs this procedure several times, bouncing light off several different spots on the wall, so that it enters the room at several different angles. The detector, too, measures the returning light at different angles. By comparing the times at which returning light strikes different parts of the detector, the system can piece together a picture of the room's geometry.



Pictures by M Scott Brauer

UPGRADE

COMPILED BY THE EDITORS *popularmechanics@ramsaymedia.co.za*

OFF THE DRAWING BOARD, INTO THE SKY

From aircraft to car in 10 minutes

We've featured some appealingly weird concepts in POPULAR MECHANICS over the years, acknowledging (with some reluctance, we might add) that some of them might never leave the proverbial drawing board. Here's the good news: the PAL-V One, a two-seater hybrid car and gyroplane, not only exists – but it flies.

Described as a "personal air and land vehicle", it offers the convenience of fully integrated door-to-door transportation. On the ground, the slim three-wheeled machine combines the comfort of a car with the agility of a motorcycle, thanks to its groundbreaking Dynamic Vehicle Control system, which automatically adjusts the tilt angle to suit its speed and acceleration.

When you're ready to sever your bond with Earth, you drive the PAL-V to the nearest airfield, unfold the single rotor and propeller, and take to the sky. It usually flies below 1 200 m, the airspace available for uncontrolled Visual Flight Rules (VFR) traffic, so there's unlikely to be any interference from commercial air traffic.

Converting the PAL-V One from aircraft to car reportedly takes no more than 10 minutes. Once the engine stops, the propeller folds automatically into the driving position. At the push of a button, the rotor mast is lowered into the horizontal position; the same motion lowers the tail, and the outer blades are folded over the inner blades via hinge mechanisms. The last steps in the process are to push the tail into its driving position and secure the rotor blades. To convert from driving to flying mode, you simply reverse the sequence.

Powered by a flight-certified petrol engine, the PAL-V One has a flying range of 350 to 500 km (depending on weather conditions and payload) and a road range of up to 1 200 km. The Dutch company behind the project says it has plans for biodiesel- and bio-ethanol-powered versions. Prices and availability have yet to be announced.

VIDEO > Visit *www.popularmechanics.co.za* to catch the PAL-V One in action.

OH, AND SKIP THE COLA

Whisky fit for a queen

It sounds a bit weird, but evidence suggests that many South Africans get choked up when they hear Elgar's *Pomp and Circumstance March No 1* (you know, "Land of Hope and Glory"), even if they're not remotely English. The same goes for news footage of the Queen as she goes about her business: they look at her with a kind of proprietary affection.

But does anyone care enough about our two countries' special relationship to pay R1,25 million for a limited-edition bottle of whisky marking Her Majesty's Silver Jubilee? Er, probably not.

John Walker & Sons, Scotch Whisky Distillers By Appointment to Her Majesty The Queen, has created the Diamond Jubilee Blended Scotch Whisky, a unique blend of grain and malt whiskies that have been maturing since 1952. Finished in a cask of English oak from the Queen's Sandringham Estate, just 60 of these rare editions, one for each year of the Queen's reign, have been offered for sale at £100 000 (about R1,25 million) each.

Master Blender Jim Beveridge and his apprentice, Matthew Crow, explored vast stocks of Scotch whisky to seek out some of the most exceptional casks of whiskies distilled in 1952, the year the Queen acceded to the throne. Two "marrying" casks were created by master cooper David Taylor, working with his journeymen tutors and apprentices, using age-old techniques.

Baccarat made the diamond-shaped crystal decanters, which stand on a base of six radial legs to reflect each decade of the Queen's reign. They are decorated with Britannia silver adornments, including a half-carat diamond by Scottish silversmiths Hamilton & Inches.

Anyone for a little snort?

VIDEO > Visit *www.popularmechanics.co.za* to watch the first US demonstration of the Honda U3-X Personal Mobility Prototype in New York.

LET'S ROLL

A novel look at personal mobility draws inspiration from the arcane field of well-balanced robots.

OK, so the Segway didn't necessarily transform mobility to quite the extent that all the hype beforehand would have had us believe. Still, the concept has endured and even been extended so that the two-wheeled device's users today range from golfers to tourists and metro cops. But Honda's U3-X Personal Mobility Concept is a significant departure: it uses a single wheel and, presumably, entails considerably more complexity.

The U3-X was launched – appropriately enough – during a Paris exhibition titled Getting Around: City, Mobility and Architecture.

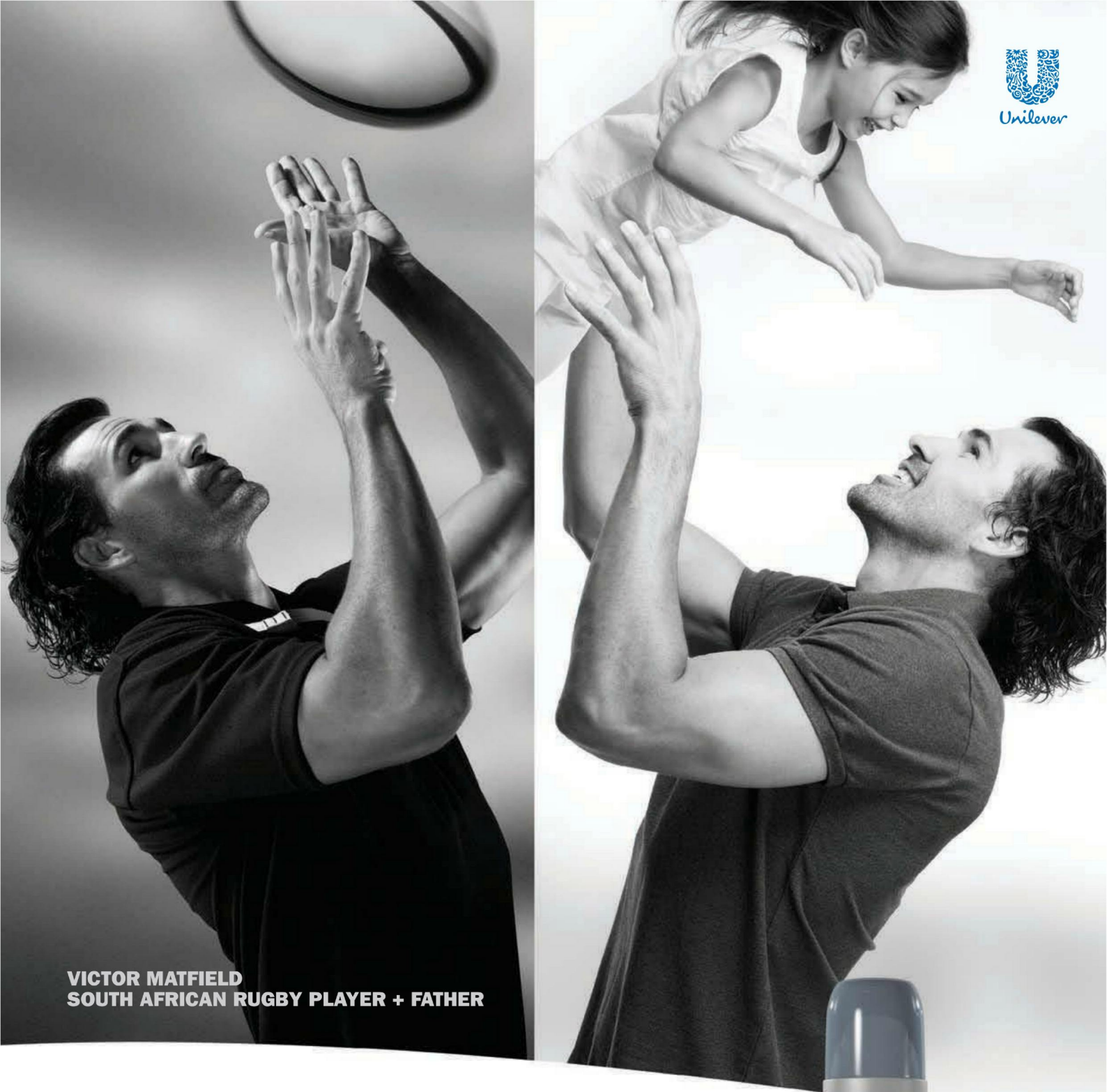
It was developed by the company's fundamental Research and Development Centre, and inspired by its robot ASIMO's ability to find its own balance point: the U3-X can stand upright by controlling its centre of gravity. A monowheel traction structure, Honda's Omni Traction Drive System, enables the U3-X to move freely and smoothly in all directions. As with the Segway, leaning your upper body to shift your weight controls the direction of travel. The device was designed to be used completely intuitively by people in settings such as museums, airports or shopping centres.

Honda says the U3-X represents an entirely new form of mobility that demonstrates a step towards a perfect fusion between man and machine. We don't know if we should be worried...

> The U3-X monowheel is powered by what Honda calls the Omni Traction Drive System.

< Sit down, lean, ride off.

The U3-X folds flat for carrying or storage... and unfolds for riding. >



Unilever

TOUGH OR CARING. WHY CHOOSE?

[48H. TOUGH ON SWEAT, NOT ON SKIN.]

FIND US ON FACEBOOK: www.facebook.com/dovemencaresa

VERVE DOVEMC25102701

PEDAL TO THE METAL

Hip new styling and performance-oriented dynamics highlight BMW's 2012 Mountainbike Enduro.

A sporty drive is part of the BMW DNA, so it's no surprise that the smile factor forms a big part of the latest bicycle designs from the performance freaks at Munich.

For 2012, BMW's off-road model, the Mountainbike Enduro, gets a new improved frame that, typically, doesn't use any mass-produced components: it's developed in-house. The all-aluminium full-suspension frame rides on Fox shocks and Shimano Deore shifters.

According to BMW, independent testing facilities have shown that the new model combines great handling, comfort and safety thanks to its customisable settings. A Crank Brothers wheelset adds stiffness and boosts downhill characteristics. As to styling, this one should look right at home on the trail: green accents on the spokes create a striking appearance on the move, particularly set against the metallic black of the rest of the bike.

Similarly funky styling upgrades have been applied to other models. The Cruise Bike's eye-catching wheelset combines radial and crossed spoke patterns plus a colour strip echoed on the handlebars and saddle. On a more practical note, 27 speeds and a fully adjustable stem give riders complete flexibility on tour. Rounding off the BMW bike line-up are the excursion-friendly 2012 BMW Touring Bike; the versatile, sporty 2012 BMW Mountainbike Enduro; the fast-moving BMW M Carbon Racer; and the Kidsbike for the littlest riders.

All 2012 BMW Bikes and matching bike equipment can be ordered from your nearest BMW Dealer. **PM**

Shimano Deore XT 30-speed

SPECIFICATIONS

2012 BMW Mountainbike Enduro (in metallic black/green)

Frame height:	M (45 cm), L (50 cm)
Frame:	Aluminium, full suspension with Horst link, BMW design
Fork:	Fox 32 RL O/B trail fork, 140 mm travel
Shocks:	Fox Float RP2 BV
Drivetrain:	Shimano Deore XT, 30-speed
Weight:	14,8 kg

TECH FOCUS

TECHNOLOGIES THAT WILL SHAPE YOUR FUTURE

PSVITA.COM

THE WORLD IS IN PLAY.

UNCOMPROMISED GAMING.

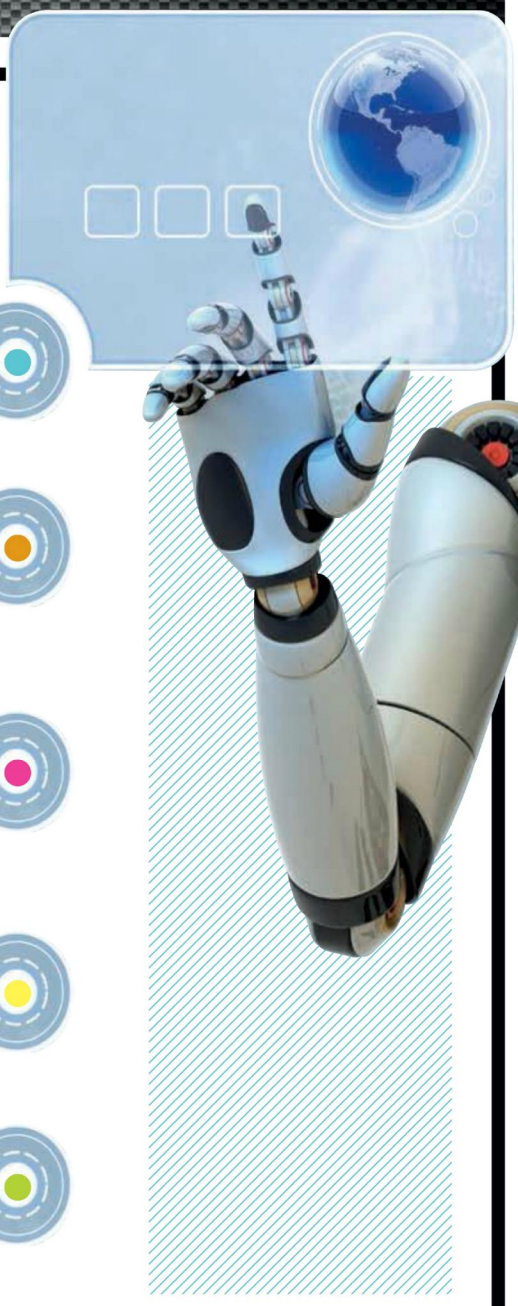
Wherever you are, the world is now your playground. WiFi, 3G, innovative social gaming, 5" OLED touchscreen, and dual analog sticks give you portable gaming like never before. Only on PlayStation® Vita.

PSVITA
PlayStation.Vita

SONY
make.believe

"PS" and "PlayStation" are registered trademarks of Sony Computer Entertainment Inc. Also, "PSVITA" is a trademark of the same company. PlayStation®Network and PlayStation®Store require mobile network or wireless internet connection and are subject to terms of use and language restrictions, see eu.playstation.com/legal for details. Users must be 7 years or older and users under 18 require parental consent. Some services require access to PlayStation®Network or PlayStation®Store or both. Additional age restrictions may apply.

CONTENTS



GET A LIFE

What it'll take for tablets to replace PCs 4
It's in our hands 6
I just can't quit you, technology 8

PLAY OUTDOORS

The vaguely interested man's guide to using a camera 10
Want a bigger boat? Just press a button 12
I believe I can fly 13
Golfing by GPS 14

STAY HOME

Appliances with brains 16
Fighting gravity, getting fit 18
Back to the future? 19
Do I make your heart race? 20

HIT THE ROAD

Flexibility in motion 22
Want to outsmart traffic? 26
On yer bike. Quickly, now 27

THAT'S ENTERTAINMENT!

Will you be buying a 3D TV? 28
The hurried man's guide to buying a new TV 30
Retro rocks 31

LET'S MAKE FRIENDS **WITH TECHNOLOGY**

Say hello to PM's inaugural *Tech Focus* supplement, our annual showcase of the best and most desirable 21st century technologies. The broad sweep of our subject matter encompasses everything from automotive tech to beguiling sound systems, from multi-purpose TVs to refrigerators that order your groceries and even monitor your diet.

We unpack the latest breakthroughs in home entertainment, help you choose your next kitchen appliance, show you a gravity-defying treadmill for post-injury exercise, and reveal some of the new products that promise to transform our workspace, our leisure activities, and much more.

Fact: technology rules our lives, and that's a good thing. It keeps our homes running smoothly and efficiently, makes our cars safer and more comfortable, provides us with jobs, introduces us to new experiences, and equips us for the myriad challenges – and exciting opportunities – in our future.

It's also responsible for keeping us connected with our world. Thanks to the Internet, television, mobile networks and many other channels, today's generation of tech-savvy consumers is the best-informed in the history of the human race. We enjoy access to an incomprehensively vast storehouse of information, some of it useful, much of it interesting, and a lot of it deliciously irrelevant.

Welcome to the useful and interesting stuff. – *The Editors*

www.popularmechanics.co.za popularmechanics@ramsaymedia.co.za mobile.popularmechanics.co.za bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook www.youtube.com/user/popmechsa mobile.popularmechanics.co.za twitter.com/popmechsa

WHAT IT'LL TAKE FOR TABLETS TO REPLACE PCs

TABLETS ARE HUGELY POPULAR, BUT THEY STILL HAVE A LONG WAY TO GO BEFORE THEY CAN REPLACE PCs. THE TECH BLOCK'S **YASIR HOSSAIN** LOOKS AT WHAT IT WOULD TAKE TO MAKE THAT HAPPEN...

WITH FEATURES SUCH AS LTE connectivity, ultra-high-resolution displays and laptop-like processing power, tablets have made their way into tens of millions of homes, and they've done it seemingly overnight. But despite popularity that borders on ubiquity and specs that edge them ever closer to desktops, it's a rare house where a tablet has replaced a full-fledged computer. Why is that? Why haven't more people scrapped their PCs for the sleeker, cheaper tablets?

The simplest answer is that tablets aren't yet designed to take on their bigger cousins. Others suggest the newness of slates is partially to blame, but considering how they've outsold PCs recently, frankly, that's crap. If they had the goods, they'd rule the roost in many households. Their low cost and extreme convenience would see to that. So what's missing? What would it take for tablets to graduate from their supporting roles and assume starring ones? To my mind, three things.

More feedback

Touchscreens come in countless shapes and sizes, but at the end of the day, they fall into two basic camps: those with multi-touch, and those without. Those without, such as ATMs or the display in my 5-year-old car, feel clunky and antiquated. They're often a pain to deal with. The multi-touch variety, on the other hand, is a pleasure to interact with. The ability to swipe, pinch, zoom and rotate content in an intuitive fashion has been nothing short of a game-changing, especially for tablets.

Apple said it makes users feel as if they're "touching the Internet". That's a bit hyperbolic, but it's true that manipulating a well-sorted touchscreen is more intimate than any keyboard-and-mouse combination. But that's not to say there isn't room for improvement.

Touchscreens lack two critical features. The first is haptic feedback, and it's not a new concept. We've seen crude versions in the past, mostly in the form of phones that respond to user inputs with slight vibrations. But that only scratches the surface of what could and should be done with technology that's been largely brushed aside as a parlour trick. Imagine, for instance, playing *Angry Birds* and actually feeling the tension in the slingshot, or drawing with a stylus in Paper and forgetting that you're not handling a real pen or marking up real paper.

Haptic feedback could even recreate the sensation of typing on a physical keyboard, and as any writer will tell you, that's critical to a decent word-processing experience. In short, it could add another dimension to tablets, one that's necessary to suspend users' disbelief and convince them that their synthetic experiences are as real and rewarding as their real-life counterparts.

Apple seems to grasp how valuable that is. Ahead of the new iPad's launch, rumours swirled that the company had paired up with Senseg, one of the foremost experts on haptic feedback. The rumour was fuelled by Apple's cryptic (it turned out to be literal) hint that it had something that needed to be seen and touched, and while haptic feedback wasn't what it had in mind, patents have since emerged that reveal the company's interest in rolling out feedback technology on its iPads, iPhones and iPod touches.

Quicker reflexes

But I told you touchscreens are in need of two innovations, and that's just one. The other applies to something that doesn't occur to most consumers, probably because it's not something many manufacturers tout, but whether or not they realise it, it affects the immersiveness of their experience just the same. I'm talking about response time.

As is, the average touchscreen's response time, or the time it takes the screen to register a user's inputs, is 100 milliseconds. That might not seem like a long time, and outside of computers, it isn't. But when you're tracing your finger over a touchscreen as you would in, say, *Draw Something*, that fraction of a second can feel positively glacial, and it's enough to remind users that although their tablets mimic many real-life activities, such as putting pen to paper, they're a far, electronic cry from the real thing. Not only that, they literally lag behind keyboards, which have an average response time of just 8 to 10 milliseconds.

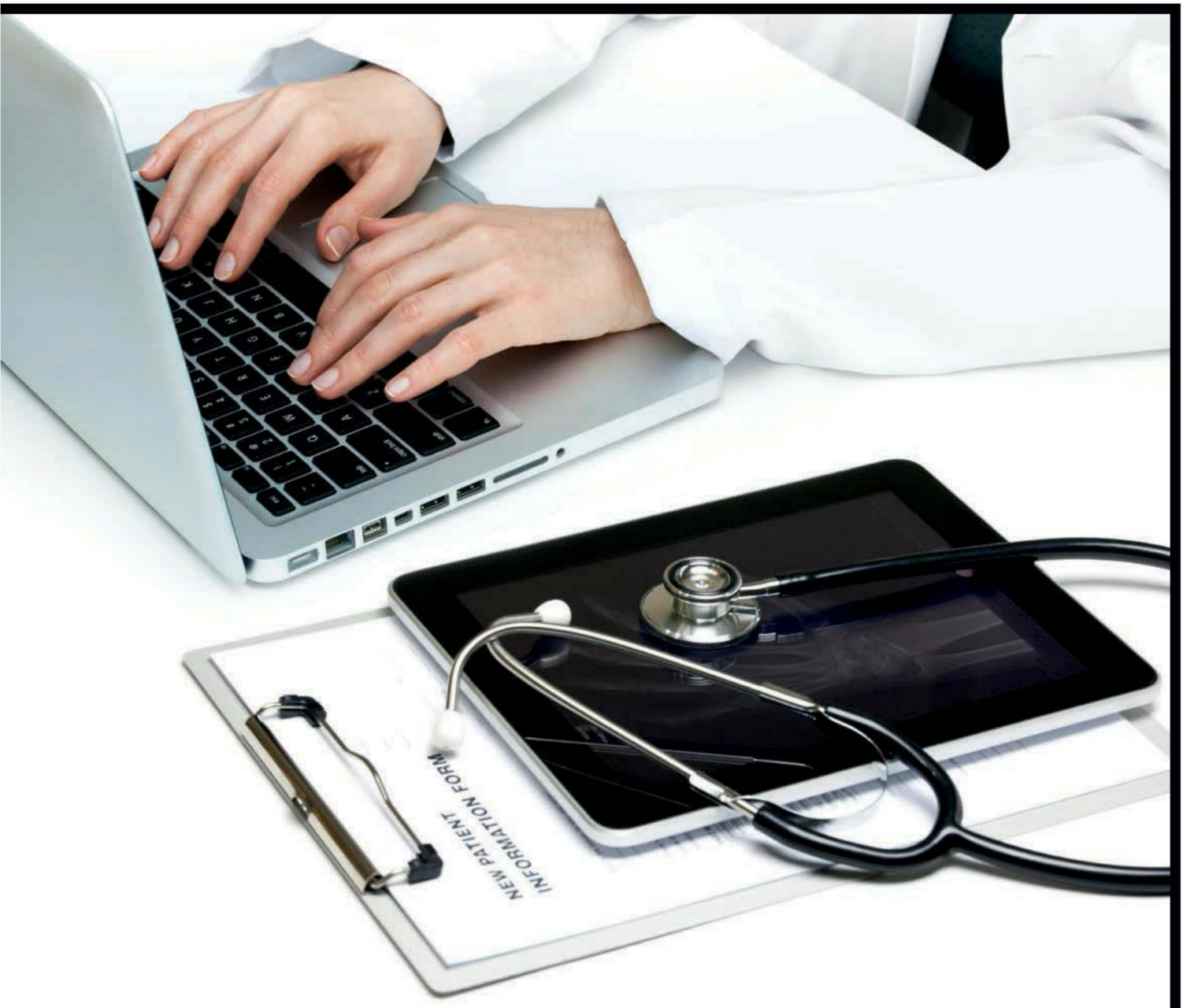
If touchscreens were to equal or better that mark, and let's face it, they have to if tablets are to have any hope of replacing their big brothers, users could more easily forget all the processes standing between their inputs and their devices' reactions, and tablets would be more attractive for it. And such an innovation isn't far off. Microsoft's Applied Sciences Group, for instance, recently showed off a touchscreen with a lightning-fast response time of 1 millisecond – 100 times faster than your run-of-the-mill slate's screen.

A split personality

The third hurdle tablets have to clear on their way to credibility is arguably the biggest: the watered-down experience. As far as tablets have come, and as many apps as developers have added to their growing arsenals, they still pale in comparison with the versatility of the average Mac or PC, mostly because they were conceived with the casualest of intentions.

Now, I'm not suggesting they turn their backs on those roots and adopt cumbersome desktop operating systems. That would be about as effective as a shot in the foot for devices that pride themselves on user friendliness. And besides, it's been done, on the first tablets, and those weren't exactly success stories.

'If it keeps up, man will atrophy all his limbs but the push-button finger.' – *Frank Lloyd Wright*



ISTOCK PHOTO/MUTLU KURTBAS

Rather, any tablet with a prayer of replacing a computer that's not covered in cobwebs needs to pull double duty; it needs to offer users the option of a bells-and-whistles operating system while preserving the simplicity that made it attractive in the first place. OnLive Desktop, an app that streams Windows 7 programs to Android and iOS slates, nearly delivers the missing half of that equation, but it's dependent on an Internet connection, and those aren't always available.

Microsoft's answer, on the other hand, won't come and go with tablets' connectivity. The company's upcoming Windows 8 tablets will greet users with a beautiful, mobile-friendly Metro UI, but when those users demand a more complete experience – when productivity's on the agenda, for example – the tablets will happily serve up Windows 7, too. And here's the takeaway: when Windows 8 tablets are docked, they'll function as full-featured laptops. I'd expound on the implications of that, but I think they're obvious.

The rub

The beauty of this wish list is that it isn't far-fetched. Each of these innovations is in the pipeline at some stage or another, and I'd wager they'll come together on a tablet in the not-too-distant future. But as capable as that device will be, with specs that are sure to satisfy all but the most demanding users, its inroads into PCs won't be automatic. Like laptops before it, it'll be up against two things: PCs, and the idea that it's nothing more than a luxury device.

● The TechBlock is a technology-oriented blog and podcast where passionate, plugged-in enthusiasts dispense with the drivel and weigh in on the latest industry news and gadgets affecting you. As they tell it, their unique emphasis on personality, beauty and clean design delivers content like you've never seen it before. Visit them at *www.thetechblock.com* □

www.popularmechanics.co.za
popularmechanics@ramsaymedia.co.za
mobile.popularmechanics.co.za
bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook
www.youtube.com/user/popmechsa
mobile.popularmechanics.co.za
twitter.com/popmechsa

IT'S IN OUR HANDS

Must-have devices will turbocharge telecoms, drive prices down and help revolutionise banking

MOBILE DEVICES AND APPLICATIONS will revitalise our ICT landscape as more and more South Africans turn to on-the-go connectivity and fun – and let's not forget our infatuation with social networks.

That's the view from someone who should know, Nashua Mobile executive head of marketing Tim Walter. "With sleek new tablets and ultrabooks reaching the market and a revolution in mobile banking, we can expect to see more and more South Africans depending on mobile communications and devices to access data for work," he says.

He puts ADSL's continuing lack of impact on broadband down to a lack of fixed-line penetration and our ongoing love affair with mobile broadband. That means ADSL is a niche market and is likely to remain such for the foreseeable future. Dropping tariffs – although the drop was not as sharp as expected – have accelerated this trend.

His forecasts for 2012:

Ultrabooks become must-have gadgets. "Cynics may simply see ultrabooks as nothing more than thin notebooks or a response to Apple's sleekest MacBooks from other PC manufacturers, but they will be one of the most talked-about gadgets of the year. Thanks to Intel's innovations in making its chips smaller and more power-efficient, manufacturers are able to make ultrabooks that are thinner and lighter than ever before while offering better battery life." **Potential drawback:** Current prices tend to restrict these to early adopters.

Tablets keep getting stronger. In 2011, 67 million tablets were sold worldwide, Walter quotes researcher Strategy Analytics as saying. "That's up 260 per cent from 18,6 million units in 2010, and the market is just getting started. According to one report, record tablet shipments in the US over the last festive season resulted in one in every five Americans owning a tablet or e-reader by the beginning of 2012." **What to look out for:** iPad 3, better Android devices from entry-level to high-end alike, and the arrival of the first Windows 8 tablets.

The notebook as commodity. Competition from ultrabooks and tablets will drive notebook prices down. **Christmas tip:** By year-end, Walter says, good notebook performance and battery life will be going cheap.

Innovations in mobile banking. Although cellphones are already one of the most heavily utilised devices for electronic banking in South Africa, they're using old technology. That's set to change as banks gear up for a mobile banking revolution; FNB led the way in 2011 with its tablet and smartphone deals aimed at getting mobile devices into its customers' hands, as well as rich apps for mobile banking. The others are likely to emulate its success, Walter says. **Gamechanging tech:** "Near Field Communications, a short-range wireless technology, will allow you eventually to use your mobile phone as your wallet. Some South African banks are already trialling the technology and most newer mid-to-high range smartphones already feature NFC. Though it won't be deployed commercially this year, expect the banks to experiment and investigate NFC very thoroughly during 2012."

Finally, Walter sees a boom in Wi-Fi networks. SA's congested mobile networks won't be able to deliver significantly lower prices or better performance until more efficient tech such as 4G – so many users will use cheaper and faster hotspot access from their tablets, smartphones and notebooks… ironically, terminating in a fixed-line connection to the Net. ☐

'Technology... is a queer thing. It brings you great gifts with one hand, and it stabs you in the back with the other.' — *Carrie P Snow*

Drive yourself well

Ford collaborates with Microsoft for in-car health and wellness research.

It's a connected world. But maintaining a connected world even on the go is not just about social networking and surfing the Net.

As South Africans take a more active role in managing their health and well-being, Ford and Microsoft researchers are pioneering in-car connectivity solutions designed to empower people to monitor and maintain health and wellness while on the move. A prototype system encompasses Ford SYNC technology, Microsoft HealthVault, Windows Azure, interactive healthcare services and biometric measurement devices.

Leveraging Ford SYNC and its ability to connect devices via Bluetooth, access cloud-based Internet services and control smartphone apps, Ford is taking charge in this automotive whitespace area, developing industry-first voice-controlled in-car connections to an array of health aids from glucose monitoring devices, diabetes management services, asthma management tools and Web-based allergen alert solutions.

"Ford SYNC is well known abroad as a successful in-car infotainment system, but we want to broaden the paradigm, transforming SYNC into a tool that can help improve people's lives as well as the driving experience," says Paul Mascarenas, chief technology officer and vice-president, Ford Research and Innovation.

With SYNC due to be launched locally in the Focus towards the end of the year, this kind of research and technology could have a significant effect on South African customers in the not-too-distant future. That prediction assumes greater importance when you consider that researchers are initially targeting the big fish: diabetes and asthma or allergies.

It is estimated that between 4 and 6 million South Africans have diabetes – and most don't even know it. This number could treble in the next 15 years, the World Health Organisation predicts. For diabetics, constant knowledge and control of glucose levels is critical to avoiding hypoglycemia (low glucose) and its symptoms of confusion, lightheadedness and blurry vision. Many depend on portable continuous glucose monitors.

Likewise, asthmatics and allergy sufferers need to be aware of their environment and potential symptom triggers – such as pollen levels in the air. So, they're fast catching on to Web-based alert services and smartphone apps that can help flag dangerous pollen levels based on location.

Here's where Ford SYNC could help:

- **Bluetooth**. Medical devices connected to the car via Bluetooth share information through SYNC, just like a driver connects and accesses a cellphone and address book by voice control. **Potential**: A monitoring device shares glucose levels and trends through audio and a centre-stack display and provide secondary alerts if levels are too low.
- **Cloud-based services**. Through an off-board network of location-based traffic, directions and information, new services such as medical services and online records could be added through SYNC's plug-and-play voice-controlled capability. **Potential**: A collaboration with SDI Health and *www.pollen.com* to SYNC-enable a smartphone Allergy Alert app through AppLink, giving voice-controlled access to a location-based day-by-day index as well as four-day forecasts of pollen levels and ultraviolet sensitivity.
- **AppLink**. The SYNC application programming interface (API) allows app developers to enable their apps to communicate through SYNC, delivering a smarter way for drivers to manage apps while driving. **Potential**: Access smartphone apps via voice control.

Long term, Ford is examining health and wellness technologies and ideas related to, for example, heart rate, relaxation and reducing stress associated with using selected vehicle technologies such as Ford active park assist and cross-traffic alert.

- Nearly 4 in 5 consumers express interest in mobile health solutions – *CTIA/The Wireless Association and Harris Interactive*
- Medical and healthcare apps is the third fastest-growing category of smartphone applications – *Digital messaging powerhouse MobileStorm*
- Of the more than 17 000 health apps available for download, three-fifths are aimed at consumers, not healthcare professionals – *Mobile research specialist Research2Guidance*

I JUST CAN'T QUIT YOU, TECHNOLOGY

WHY PEOPLE ARE TAKING A BREAK FROM TECHNOLOGY – AND WHY IT'S GOOD FOR YOUR BRAIN, YOUR HEALTH AND YOUR RELATIONSHIPS.

BY AMY KLEIN

SCIENCE FICTION ONCE PREDICTED that robots and machines would take over our lives. Considering our reliance on our gadgets, that might not be too far from the truth. How many times a day do you check your cellphone? Your Facebook page? Your Twitter feed? How many texts do you send and receive each day? Now tally up the time you spend in front of screens, from your computer to your iPad to your TV, and you'll see how technology is running – and maybe even ruining – your life.

Some people expressed their misgivings by joining in the National Day of Unplugging, which took place a few months ago. Founded by the Sabbath Manifesto, a creative project designed to slow down lives in an increasingly hectic world, the unplugging was meant to mimic the religious sabbath, where work ceases so you can become closer to your family, friends and spiritual life. Others are trying "technology fasts" – sporadic breaks at different times from various technologies.

Here are eight reasons why it's good to take a tech break:

1. Technology can cause stress

"The purpose of almost all technology is to do things faster, and often better, than we humans can," writes Jim Calloway, co-editor of *Winning Alternatives to the Billable Hour: Strategies That Work*. Although the promise of technology used to be that it would lighten our load, it often increases it – by giving us more time, we now have more time to work. "We can, and therefore do, run at a faster pace. And if you let technology set your pace, it will make you run faster and faster."

2. Technology can ruin your health

Researchers who surveyed over 4 000 American high school students last year found that excessive texting and social networking – sending 120 text messages or more during a school day, and using online social networking sites for at least three hours per school day – was linked to a range of poor health behaviours, including smoking, drinking, use of drugs and sexual activity. These were the results of a study led by Dr Scott Frank, director of the Master of Public Health programme at Case Western Reserve School of Medicine.

Dr Frank presented the findings at the 138th Annual Meeting and Exposition of the American Public Health Association in November 2010. In addition to the aforementioned, "hyper-texting" and social networking was also linked to perceived stress, having suicidal thoughts, obesity, disordered eating behaviour, missing school due to illness, having lower self-rated health, feeling unsafe at school, not getting enough sleep, and parental permissiveness.

'Any sufficiently advanced technology is indistinguishable from magic.'
– *Arthur C Clarke*

3. Technology can rewire our brains

"We know that the brain's neural circuitry responds every moment to whatever sensory input it gets and that the many hours people spend in front of the computer – doing various activities, including trolling the Internet, exchanging e-mail, video conferencing, IM'ing and e-shopping – expose their brains to constant digital stimulation," write Dr Gary Small and Gigi Voran in *iBrain: Surviving the Technological Alteration of the Modern Mind* (HarperCollins, 2009).

Dr Small and his UCLA research team wanted to look at the impact this extended screen time was having on the brain's neural circuitry, how quickly it could build up new pathways, and whether or not they could observe and measure these changes as they occurred. Using fMRIs, they compared computer users to "naive" (non-computer) users and found that after five hours on the Internet, the naive subjects had already rewired their brains.

"This particular area of the brain controls our ability to make decisions and integrate complex information. It also controls our mental process of integrating sensations and thoughts, as well as working memory, which is our ability to keep information in mind for a very short time – just long enough to manage an Internet search task or dial a phone number after getting it from directory assistance."

4. Technology can ruin our attention span

Small and Voran also write in *iBrain* that the high-tech revolution has put us into what software executive Linda Stone calls "continuous partial attention", which means continually staying busy – "keeping tabs on everything while never truly focusing on anything". This differs from multi-tasking, where there's a purpose for each task and we're trying to improve our productivity and efficiency.

"When paying continuous partial attention, people may place their brains in a heightened state of stress. They no longer have time to reflect, contemplate or make thoughtful decisions. Instead, they exist in a sense of constant crisis... on alert for a new contact or bit of exciting news or information at any moment."

According to Small and Voran, once people get used to this state, they tend to thrive on perpetual connectivity. Eventually, they say, the endless hours of unrelenting digital connectivity can create a "unique type of brain strain". Many people who have been working on the Internet for several hours without a break report making frequent errors in their work. Upon signing off, they notice feeling spaced out, fatigued, irritable and distracted, as if they are in a "digital fog". They call this a techno-brain burnout.

5. Technology can hinder creativity

In the book, *Defeating the 8 Demons of Distraction: Proven Strategies to Increase Productivity and Decrease Stress*, Dr Geraldine Markel gives an example of how technology ruins the creative process – and the work process: "Steve is extremely bright and creative. He enjoys surfing the Internet and discovering new ideas. As a word or concept pops into his mind, his fingers tap him into uncharted territory. Four or more hours can fly by.

"Unfortunately, these Internet explorations distract him from completing his projects. On the one hand, Steve is an 'idea generator' at a public relations firm, so he needs to keep abreast of new developments. On the other hand, he still has to complete his projects." When not controlled, she writes, Steve's "curiosity" becomes a hindrance and erodes his performance and potential.

6. Technology can interrupt romance, friendship and parenting

Do you really need a scientific study to prove this? Just check out the look on your child/spouse/friend or colleague's face when you sneak a look at your BlackBerry while they're talking to you. "Research and various studies have demonstrated the importance of attachment to other people on how well we cope with life, feel safe in relationships, and manage stress," writes John O'Neill, director of addiction services at the Menninger Clinic in Houston, in *Time to Disconnect?*

"Technology overload damages relationships, but is it an addiction?" (*Highlights of the American Bar Association, Winter 2008*). "Furthermore, we know that children who suffer from attachment disorders struggle with trust, superficial relationships, poor peer relationships, lying, fear of intimacy, shame and feeling alone." O'Neill gives an example of a father and son at a baseball game, where the father is too busy talking on his cellphone to notice his son's attempt at catching a home run.

"What could have been a significant bonding moment was derailed by the father's inability to disconnect from technology," he writes. "Observing people on a daily basis, it is easy to recognise how lost we have become in our own worlds.Talking on the phone, returning messages, playing games, listening to music on headphones that block out the world and other examples illustrate how easy it is to escape."

7. Technology can be isolating

"Mobile phones, computers and other such tools enable us to communicate so easily, they trick us into believing that we will be able to satisfy our communication needs when, at best, they are able to give us only a small portion of what we actually need," writes Harley Hahn, who coined the phrase "Island Syndrome" to define our state of isolation and dependence on technology today.

Technology continually seduces us by promising to give us what we want, and we don't understand what is happening, he says. "This is why so many people keep phoning, text messaging, instant messaging and e-mailing one another without ever feeling satisfied enough to stop: it is a combination of seductive technology, bad communication habits, and ignorance of our real needs. We are betrayed continually by a confluence of forces that promise to fulfil us without actually doing so."

8. Technology can be an addiction

According to a phone survey conducted by Stanford University back in 2006 – before the crazed Twitterverse! – more than one in eight adults in the United States showed signs of being addicted to the Internet. "Addicts' showed signs of compulsive Internet use, habitually checking e-mail, Web sites and chat rooms. More than 8 per cent of the 2 513 respondents said they hid their use from partners.

"We often focus on how wonderful the Internet is, how simple and efficient it can make things," elaborated lead author Dr Elias Aboujaoude, clinical assistant professor in psychiatry and behavioural sciences and director of Stanford's Impulse Control Disorders Clinic. "But we need to consider the fact that it creates real problems for a subset of people."

In the end, however, technology is not evil; like anything else, it must be used in moderation. As O'Neill writes: "Technology has enormous benefits that assist us on a daily basis. Cellphones help us keep up with family, friends and business, and assist us in an emergency. The Internet is a wonderful resource filled with knowledge and endless learning opportunities. Evidence shows that video games can improve various motor skills and problem-solving skills. The hope is that we can apply technology with a healthy balance and set limits."

● First published in *Brain World*. □

www.popularmechanics.co.za popularmechanics@ramsaymedia.co.za mobile.popularmechanics.co.za bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook www.youtube.com/user/popmechsa mobile.popularmechanics.co.za twitter.com/popmechsa

THE VAGUELY INTERESTED MAN'S

HOW TO OPERATE YOUR CAMERA
1. HELPFUL BUTTONS: A VISUAL PRIMER

1. VIEW Look at your photos.

2. MENU Where you'll find controls for things such as ISO, white balance and noise reduction.

3. AUTO-EXPOSURE LOCK/ AUTOFOCUS LOCK
Locks the autofocus and exposure, keeping the focal point on the mountains and not the smudge on your car window.

4. RECORD
Begins video-mode capture.

5. DELETE

6. TIMER
Useful if you want Dad to be in a few pictures.

7. EXPOSURE VALUE COMPENSATION
An easy way to brighten or darken your pictures without going into the camera's menu.

8. NIGHT MODE
Lets more light into the sensor and uses flash to brighten dark pictures.

9. MACRO
Focuses on the tiniest details of the tiniest subjects. **Best for:** people familiar with words such as *pistil* and *stamen*.

10. ACTION
Freezes fast things such as cyclists, sprinters, and the guy who's running away with your lens kit.

11. LANDSCAPE
Increases f-stop to capture the entire scene in detail.

12. PORTRAIT
Softens the background slightly (by decreasing f-stop) and focuses on the person.

13. AUTOMATIC
Everything is set for you.

14. MANUAL
Should also read: expert. If you know you need an ISO 200 f/5.6 with a shutter speed of 14 seconds to shoot a great night-time cityscape, and you can find the buttons to make that happen, go for it. **Best for:** photography class.

15. APERTURE PRIORITY
You control aperture; the camera selects shutter speed. **Best for:** portraits, still lifes.

16. SHUTTER PRIORITY
You control shutter speed; the camera selects aperture. **Best for:** sport.

17. PROGRAM
The camera controls aperture and shutter speed; you control the rest. **Best for:** nearly everything.

18. POWER SWITCH

19. FLASH
A general rule: turn off the flash. Especially if you are more than 2 m away from what you're shooting. Use the flash only to freeze action, in dimly lit rooms, or if you're determinedly pro.

20. ATTACHMENT LOOP
Not a button. The place to hook a lanyard, if you're into such things.

'For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled.' – *Richard P Feynman*

GUIDE TO USING A CAMERA

By Rachel Sturtz

OKAY, NOW TO THE NITTY GRITTY

2. HOW TO SHOOT

... A LANDSCAPE

Shoot within 20 minutes of sunrise or sunset, when the Sun doesn't cast harsh shadows. And never centre the horizon: it cuts the picture in half and makes it a lot less interesting.

... AT NIGHT

If you can adjust your flash, aim it toward the ceiling or a wall: bouncing the light off another surface diminishes shadows and creates a softer light source, kind of like those umbrellas they use at photo studios. If your flash is fixed, place a napkin or a piece of paper over it. And if you have a tripod – or a very steady hand – a slower shutter speed will bring out more natural light.

... A PORTRAIT

To make it interesting, mess with the lighting, the framing or the pose. One safe bet: always focus on one of the subject's eyes.

... A NAKED WOMAN

Use soft, comfortable lighting – natural, if possible – until you really know what you're doing. Harsh light will only bring out imperfections. Pick her best feature – her legs, her neck, her lower back – and focus on it. Or just cover the lens with a thin coating of Vaseline to get a dreamlike, sexy picture that most people can't screw up. And don't perve.

THE VOCABULARY

Aperture (f-stop)
Measured in numbers from f/1.4 to f/22. The lower the number, the wider the lens opening. The wider the opening, the more light let in and the more shallow the depth of field.

Depth of field
The number of planes in focus. ***HELPFUL TIP:*** Picture a row of fence posts going into the horizon. At f/2, two will be in focus, with everything behind them blurred out. At f/11, eleven will be.

Exposure
The amount of light let through the lens. Determined by aperture and shutter speed.

Shutter speed
The amount of time the shutter stays open. The faster an object is moving, the higher you want your shutter speed. To capture a football mid-flight, 1/2 000; for grandma standing next in front of Table Mountain, 1/125. ***HELPFUL TIP:*** Don't set your shutter speed slower than 1/60 without a tripod.

Tripod
What people who are better photographers than you use to take their pictures.

ISO
The sensitivity of the camera's sensor. When you have good light (anything that doesn't set off the automatic flash), use a lower ISO. ***HELPFUL TIP:*** Setting your ISO over 1600 often leads to noise.

Noise
Graininess in an image.

Rule of thirds
A way to take better pictures. Imagine a noughts-and-crosses boardacross your viewfinder. Position the people or things most important in your photo on one of the four intersecting points of the board. Never centre.

Temperature
The colour balance in an image. Warm photos are heavily orange and red; cool photos are blue and green. Good photos are neither.

Cellphone
A device for calls. Not a camera.

Raw file
An unprocessed image. Gives you more flexibility in changing colour and exposure in the editing process. Unless you are paid for your photography, you will never use this.

The post-click assault
The overwhelming urge people get to inspect a picture immediately after it is taken.

Automatic
A setting on your camera that obviates the need to know most of the terms above. ☐

WITH SPECIAL THANKS TO KEVIN FLEMING OF KEVIN FLEMING PHOTOGRAPHY

www.popularmechanics.co.za popularmechanics@ramsaymedia.co.za mobile.popularmechanics.co.za bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook www.youtube.com/user/popmechsa mobile.popularmechanics.co.za twitter.com/popmechsa

WANT A BIGGER BOAT? JUST PRESS A BUTTON!

We've encountered many strange and exciting boat designs over the years, but this one ranks as a first – a big motor yacht that can double its deck area in just 12 seconds. Meet the appropriately named Wider 42...

WIDER IS AN INNOVATIVE YACHTING COMPANY founded in 2010 by Italian Tilli Antonelli. Its first effort was the Wider 42, a high-performance, lightweight model built according to the very latest vacuum-infusion moulding techniques, using carbon, vinylester resins and other components in vacuum "pre-preg" carbon. Developed with the help of Mark Wilson, an acknowledged expert in the field of racing yachts, it features excellent weight distribution, stepped hull technology, an Arneson Drive and high-performance propellers. Okay, that's the conventional part of the story out of the way.

What is *really* attracting the attention of boat show visitors across the United States is the boat's ability to expand its deck area (they call it the "cockpit") within 12 seconds at the press of a button.

When opened out, the central cockpit provides a flat, usable surface area of 18 m^2 – or, as the company puts it, "the equivalent of the cockpit of a 40-metre megayacht – and a flotation width of 6,6 metres. Besides creating additional space on board, this feature makes the yacht highly stable, since the stainless steel hull extensions are lowered to make contact with the water.

That's not where the boat's high-tech credentials end. At the helm, you'll find a GPSMap 7012 Garmin chart plotter equipped with a 30-cm touchscreen display featuring the new G-Motion technology, which allows for extraordinary fluidity when switching from one screen to another, with imperceptible updates of the different zoom levels and 3D graphics.

Next on the company's boatbuilding menu is the formidably large (46-metre) Wider 150, featuring a hybrid propulsion system (diesel/electric) that reportedly assures buyers of low fuel consumption and an excellent range – a useful eight hours on the batteries only, with all onboard appliances in use. Top speed is 20 knots.

The boat comes with a number of other, equally compelling features, among them a large tender accommodated in the transom. A floating launch system allows the tender to dock and leave with minimal fuss, the vacated space becoming a salt-water swimming pool if required (also known as the sea!). The forward area is designed to house two additional tenders and a covered garage that can accommodate two jet skis or perhaps a Tesla Roadster.

We're not sure what all this will cost, but it's safe to assume that it will be rather a lot. □

'Men have become the tools of their tools. – *Henry David Thoreau*

I BELIEVE I CAN FLY

Remember the flying car invented by Terrafugia? We showcased it in PM a couple of years back, recalling similarly inspired – but markedly less sophisticated – vehicles that never quite made the grade. Well, this concept is destined to move the proverbial goalposts: it not only flies, but is actually a few steps from production.

HAVING COMPLETED a successful test flight, the Transition Street-Legal Airplane is now a significant step closer to becoming a commercial reality – and for once, the sceptics and naysayers are silent. Developed by US company Terrafugia Inc, the Transition is a folding-wing, two-seater aircraft that can be driven on roads and highways, parked in a single-car garage, and flown with ordinary unleaded fuel.

Terrafugia co-founder Carl Dietrich is obviously upbeat about its prospects, commenting: "The first flight of the Transition production prototype is a major milestone for Terrafugia. With this flight, the team demonstrated an ability to accomplish what had been called an impossible dream. We look forward to continuing to show that the challenges of bringing a practical street-legal airplane to market can be overcome. We are on our way up – literally and figuratively!"

The Transition's first flight reached an altitude of 420 m and lasted eight minutes, while staying in the vicinity of Plattsburgh International Airport (USA), demonstrating the aircraft's controllability and safe operational characteristics. Six phases of flight testing are planned to continue development and demonstrate compliance to Light Sport Aircraft standards.

Terrafugia's chief test pilot, Phil Meteer, said afterwards: "It's a remarkable vehicle – both on the road and, now, in the air. A long-overdue mode of transportation and fun is just around the corner. I can't wait for the upcoming flight tests and the chance to 'wring it out', demonstrating how safe and enjoyable the Transition is to fly." The aircraft's first customer is expected to take delivery later this year. ☐

www.popularmechanics.co.za
popularmechanics@ramsaymedia.co.za
mobile.popularmechanics.co.za
bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook
www.youtube.com/user/popmechsa
mobile.popularmechanics.co.za
twitter.com/popmechsa

TEE TIME

TAKING THE GUESSWORK OUT OF GOLF

WEEKEND GOLFERS simply don't have the time to hone their game the way the pros do. So anything that gives them an edge without too much effort is likely to be welcomed – Garmin's Approach S3 Touchscreen GPS Golf Watch, for instance.

GPS fitness tech has revolutionised the way in which sportspeople analyse their workout – from runners to cyclists and kayakers. The golf watch adds a new dimension: guidance. It's a GPS, after all.

This stylish device comes preloaded with 27 000 worldwide courses to help you optimise your strokeplay, even on unfamiliar territory. Features include Green View with manual pin positioning, distances to doglegs and layup points, customisable yardage points and digital scorecards. It's like having a virtual caddie during every stroke.

"It's lightweight, it includes a round timer to keep track of time played and the colour options will make it a talking point on and off the course," says Dan Bartel, Garmin's vice-president of worldwide sales.

Free course updates, offered throughout the year, add new courses and make enhancements to the current line-up to help ensure accuracy. According to Garmin, just as courses change, so do the pin placements. "With the new Green View feature golfers can see a true image of the current green and the flag can be adjusted for the current day's pin placement with the simple touch of the screen. As adjusted, it displays the distance to the pin, front and back of the green."

A GPS's ability to set waypoints is used in the S3 to add custom points for measuring or zeroing in on hazards or obstacles that may affect a shot. It's also possible to zoom in for a closer look at the green.

Sleek enough to wear as a day-to-day timepiece, the Approach S3 is built waterproof and rugged but weighs only about 50 grams. Its high-resolution sunlight-readable touchscreen display – designed to be glove-friendly – provides large, bright numbering.

On a full charge the S3 providers eight hours of playing time and up to four weeks as a day-to-day timepiece. Charging the internal battery is as easy as connecting the watch to a small magnetic clip on its custom charging cradle.

Golfers can review their scores on the device, or download and access a printable version of their own round on their computer. Scoring options include Stroke Play and Stableford. □

'You cannot endow even the best machine with initiative; the jolliest steam roller will not plant flowers.' – *Walter Lippmann*

Speak fluent Jaguar. From AI to ZF*

Talking sense about today's automotive complexities requires a technological vocabulary of above-average size and scope. Fortunately, should the Jaguar owner become involved in a discussion, the formidable technologies integrated seamlessly into his vehicle ensure that size or scope will never be a problem, whether around the dinner table or in the locker room.

All the way from **AI** for the weight-saving aluminium architecture to **ZF** for the high-tech, economical transmission that shifts in a heartbeat – no, make that faster than a heartbeat – we're talking the language of innovation.

Case in point: **Aluminium's** strength and lightness compared with conventional alternatives in body and engine construction help maximise performance, agility and economy. The flagship XJ's lightweight aluminium structure – half of it made from recycled materials – cuts fuel consumption and emissions. In conjunction with a lifecycle approach to design and manufacture, this shrinks the XJ's carbon footprint.

Under the bonnet, the all-new 8-speed **ZF automatic gearbox** shifts ratios in 200 milliseconds. Thanks to lightweight materials and smarter design it's no heavier than its 6-speed predecessor, yet more efficient.

In between these two extremes, there's plenty more to talk about.

Such as the **Intelligent Stop/Start** integrated into the super-economical 2,2-litre diesel engine, the first time this technology has been seen in a premium diesel saloon. Automatically shutting down the engine in just 300 milliseconds when the car comes to rest, it improves fuel economy and CO_2 emissions by between 5 and 7 per cent. It's lightning-fast on the restart, too: between the time your foot leaves the brake pedal and reaches the accelerator, a tandem solenoid starter with a dedicated secondary battery will have restarted the engine.

The **2,2-litre diesel** itself is worthy of mention. Low-friction pistons and a water-cooled turbocharger increase efficiency and active engine mounts help minimise noise and vibration in the cabin. Jaguar's most fuel-efficient engine ever, it is as refined as the previous 2,7-litre V6 diesel version.

Higher up the scale, **the 5-litre AJ-V8** engine incorporates spray-guided direct injection (SGDI). Relevance? Direct injection channels a precise, high-pressure fuel/air blast directly into the combustion chamber for better efficiency and emissions levels. SGDI optimises the spray pattern further… yes, it's about shrinking the carbon footprint.

As if that's not enough, dual independent variable cam timing (DIVCT) precisely manages the flow of intake and exhaust gases. You'll hardly notice – except for when you put your right foot down. Similarly discreet is **Adaptive Dynamics**. Suffice it to say that, 100 times a second, Jaguar's electronic brain analyses the thousands of inputs and variables that determine ride and handling characteristics. It monitors wheel position 500 times a second. All of this seamlessly varies the car's damping to negate the traditional trade-off between ride comfort and handling.

Above: AJ-V8, a tech tour de force from the outside – and inside.
Below: HID xenon headlights plus LEDs create distinctive J-Blade design.

While the outside world recedes into the distance in more ways than one, advanced new technology has also allowed Jaguar's interior designers to create an environment that is more state-of-the-art living space than car cabin. High-definition **virtual instruments** complement a touchscreen display providing innovative control of car functions – all discreetly integrated – in combination with ergonomic switchgear. The advanced infotainment system, based on a central **hard disc drive** used for audio and navigation, offers comprehensive connectivity for portable audio and video streaming via a powerful Media Hub. You can even rip CDs to the hard drive's virtual CD multichanger. These functions – and many more – can be controlled hands-free simply using spoken commands in Jaguar's intuitive **Interactive Voice** functionality.

Naturally, there's a lot more to the Jaguar tech alphabet. For example, the **bi-function HID xenon headlights** not only help you see better in the dark: slim and compact, they allow the stylists a freer rein – and the **LED daytime running lights** they incorporate are arranged in an instantly recognisable Jaguar "J-Blade" signature pattern.

We could go on and on. But we're confident that, with a firm grip of the basics, you'll never be at a loss for words.

*** We trust your enquiring nature will fill in the gaps.**

More state-of-the-art living space than car cabin, the interior features an innovative touchscreen display, virtual instruments and ergonomic controls.

APPLIANCES WITH BRAINS

REMEMBER WHEN THE TYPICAL KITCHEN APPLIANCE WAS A SIMPLE MACHINE THAT YOU SWITCHED ON TO DO ITS JOB, THEN SWITCHED OFF ONCE IT WAS FINISHED? THINGS HAVE CHANGED, AND THEN SOME. TODAY'S APPLIANCES HELP YOU TO LOSE WEIGHT, DO THE SHOPPING, TALK TO EACH OTHER, AND OCCASIONALLY EVEN GIVE YOU LIP...

LG ELECTRONICS is targeting the new breed of demanding, tech-savvy consumer with a range of distinctly smart kitchen appliances that reflect what the company describes as its vision for a "more connected, eco-friendly lifestyle".

Unveiled at the International Consumer Electronics Show (CES) in Las Vegas earlier this year, the products – centred on the company's proprietary Smart ThinQ technology – showcase some innovative device-to-device connectivity features as well as the LG Home Energy Management System. Its smart appliances are differentiated with four complementary technologies – the Linear Compressor, the Inverter Direct Drive, the Infrared Grill and the Kompressor. Among the more compelling features is enhanced device-to-device connectivity, which enables the smart refrigerators and smart washing machines to be monitored from a Smart TV or smartphone. For instance, individuals can monitor the status of their laundry cycles from their TV screen without needing to be physically present in the laundry room.

Says Moon-bum Shin, CEO of LG Electronics Home Appliance Company: "Device-to-device connectivity with smartphones and among LG appliances is... helping consumers handle housework in a smarter manner by saving time, money and energy."

A SERIOUSLY COOL FRIDGE

Built around LG's signature Linear Compressor, the flagship smart French-door refrigerator is equipped with a full range of Smart ThinQ technologies. Key among them is Smart Manager, which transforms the fridge into a complete food management system. You can use the fridge's LCD panel or your smartphone to check the food items stored inside, as well as their location and expiration date. Using the Smart Manager's Freshness Tracker, you can also enter various food items such as eggs, milk and vegetables, and check their suggested expiry dates. Here's where it gets *really* cool: the fridge even recommends dishes that can be cooked using the ingredients available on its shelves.

There are multiple ways to record the food items stored in the fridge, including selecting icons from the panel and using voice recognition technology. Grocery receipts can be scanned with your smartphone, allowing the fridge to automatically download the food item list. Barcodes can also be scanned with smartphones to input food items.

Then there's Smart Shopping, which offers online grocery shopping directly from the fridge's LCD panel or smartphone. A shopping list is created by selecting food items from the inventory, which will be loaded on to Smart Shopping by pressing the "Go Shopping" button. You can buy these food items via the refrigerator's LCD panel or smartphone, while items not on the list can be searched for and selected manually. These features eliminate the hassle of having to write down grocery shopping lists the old-fashioned way or the need to visit the grocery store.

It doesn't end there. The Smart Manager now includes LG's Health Manager function, which recommends recipes and menus based on personal profiles that take into account factors such as an individual's age, gender, weight, height and Body Mass Index (BMI). The information is used to determine options that may be more suitable to the person's physical condition and might be particularly useful for consumers with medical conditions that require special diets, such as diabetes, high blood pressure or food allergies, and for those on a weight-loss programme. The Health Manager even recommends daily or weekly meal plans based on personal profiles, while also

'It is only when they go wrong that machines remind you how powerful they are.' — *Clive James*

NOW YOU'RE COOKIN'

LG's Smart Oven comes equipped with a suite of Smart ThinQ features, including Smart Access (this allows you to monitor cooking settings such as time and temperature via your mobile device,) Smart Adapt (you can send cooking time information by smartphone, directing the oven to cook sumptuous dishes via its auto-cooking function), and Smart Diagnosis (makes it easy to diagnose simple problems by using a smartphone application or through direct contact with the customer service centre). The oven is equipped with an infrared grill, which reportedly cooks food more efficiently and evenly.

providing recipes for each dish. Should you wish to cook a recommended dish, you can select the dish and press "Send to Oven," which sends the necessary information to a LG Smart Oven and automatically arranges the proper oven settings (of course, this assumes you have also coughed up for the appropriate stove).

The Smart Access feature lets you check the status of your LG appliances via a smartphone, regardless of your geographic location. You can check food items that are running low while you're in a grocery store, reducing the chance of accidental double purchases and saving money on groceries.

In the er... unlikely event of a glitch, the Smart Diagnosis feature will enable a customer service representative to efficiently troubleshoot the issue. You can also be directly alerted through your smartphone about minor issues, such as when the door is left open or the ice-maker is switched off.

LG's smart fridge also offers something called "Night Saving Mode", which reduces energy consumption for up to four hours during the night, plus a "Customise Saving Mode" that lowers energy use during periods pre-set by the user. Oh, and lest you think it's all about keeping food cold and conserving energy, the fridge offers access to digital photo albums, calendars, text memos and news reports (a voice memo function is planned for the future).

Finally, although this may be of academic interest only to South African customers, the fridge comes Smart Grid-ready. Here's how it works: overseas, as utility companies begin offering Smart Grid-compatible, differentiated energy-rate time slots, the fridge will be able to automatically readjust its temperature and function settings to take advantage of optimum energy rates on a daily basis, offering a smart energy-saving solution.

KEEPING IT CLEAN

If you thought washing machines were useful but basically quite dumb, think again. New for this year is a machine featuring (wait for it) Smart Diagnosis, Smart Access, Smart Adapt and Smart Grid-ready functionality. Would you believe a washing machine with official Wi-Fi certification? Anyway, should a problem occur, this clever machine will quickly and efficiently troubleshoot it, thereby obviating costly service calls and in-home visits. A downloadable smartphone application will alert you to less significant problems, such as when the door is left open.

Like the refrigerator, the washing machine uses Smart Access to keep you connected, regardless of your location, so you no longer need to worry when leaving the house with the washer running. Certain functions, such as changing the pre-programmed wash time or adding fabric softener, can be adjusted by remote control and pop-up messages on the smartphone signal when the wash cycle is finished. You'll also like Smart Adapt, which makes it possible to download new washing cycle programs, such as Super Rinse and Baby Sanitise, through your smartphone or via the washing machine's LCD panel. ☐

www.popularmechanics.co.za popularmechanics@ramsaymedia.co.za mobile.popularmechanics.co.za bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook www.youtube.com/user/popmechsa mobile.popularmechanics.co.za twitter.com/popmechsa

FIGHTING GRAVITY, GETTING FIT

Are you a super-fit weekend warrior recovering from surgery, or perhaps a hardcore athlete who's determined to train through an injury? Then you have to meet the AlterG Anti-Gravity Treadmill, an amazing device that enables you to rehabilitate faster, train like a pro or even accelerate weight loss.

OKAY, WE KNOW you can't simply turn a dial to get rid of gravity, the all-pervasive force that has shaped our Universe (and occasionally brings us down to Earth with a nasty bump). But if there were a way to use clever technology to counteract it and effectively reduce our weight while we fight our way back to fitness, wouldn't that be cool?

The folk at AlterG certainly think so, which is why they've developed a range of machines using so-called Differential Air Pressure technology to apply a precise and comfortable lifting force to the body, allowing you to run and walk at a fraction of your body weight (that is, you temporarily "lose" up to 80 per cent of your weight). This, they say, reduces the impact on joints and muscles to provide a smooth recovery from injury or surgery while training.

Using the AlterG is easy. You step aboard the treadmill, raise the enclosure to your waist and zip into the air chamber that surrounds your lower body. The machine measures your weight and allows you to adjust it simply by pressing an arrow on the control panel. An air chamber inflates around your lower body, the pressure effectively "floating" you off the treadmill to the desired weight setting. As with conventional treadmills, the speed and incline are adjustable, allowing you to exercise at your desired intensity.

Says Bryan Nadeau of Muir Orthopedic Specialists: "Whether recovering from injury or surgery, pushing the limits to improve race times, or simply trying to get back into shape, removing the physical burden of weight bearing has (produced) remarkable results." □

'Everybody has to be able to participate in a future that they want to live for. That's what technology can do.' – *Dean Kamen*

BACK TO THE FUTURE?

INSPIRATION SPRINGS FROM TRADITIONAL HANDWASHING

IT'S IRONIC: here's an example of cutting-edge technology, designed to liberate us from manual labour, that relies on a method our ancestors were familiar with – the good old rub-a-dub-dub.

In the quest for a cleaner wash, not to mention whiter whites and brighter colours, Samsung's engineers found what they were looking for in the time-honoured method of handwashing. It's all about the foam, of course. We all know deep foam is the business, even in cold water. It penetrates to where it's needed, and it *feels* right.

How this came to be incorporated in a washer design came about through analysing historical washing practices. The hand-wash methods of previous generations created masses of rich, soapy foam for their laundry. That's replicated by Samsung using a special component called the Bubble Generator. Just as the wash cycle begins, the generator uses an initial water intake, creates a concentrated detergent solution and sucks large quantities of air into the flow, pumping this mix rapidly up into the wash drum.

Fundamentally, this system creates a foam wash that penetrates clothes deeper, faster and more evenly. Because it uses cold water, it cuts energy consumption, is kinder to fabrics and is less harmful to the environment than conventional hot-water machines.

Pioneered in 2010, the Deep Foam range was showcased in upgraded and extended form at Samsung's recent Africa Forum. Notably, the Digital Inverter Motor has been optimised for greater energy efficiency; 2012 models include this new brushless motor, which is more reliable and long-lasting, even at high spin speeds with larger loads – and it carries a 10-year component warranty.

There are also practical considerations addressed by the 2012 range. For instance, it's easy to pass off washing as just another mindless chore, but it can have a significant impact on domestic economies and arrangements. Larger households often run cycle after cycle to try to stay ahead of the laundry load; on the other hand, overloading to try to save time will compromise performance. To address that, the 12 kg load capacity Deep Foam front loader washer has the biggest wash size available in Africa in a standard cabinet.

A smart weight sensor detects the size of the load and calculates how much water and energy is needed to clean it. Moreover, a new colour LCD on the front panel indicates the most ener gy-conscious washing programme (the machine is rated A+++ for energy consumption in spite of its big capacity).

The Deep Foam system is said to be good for delicate fabrics, too. Popular modern fabrics are sometimes so delicate that they require cold washing with very gentle mechanical action, but people still want the convenience of automatic machine washings rather than hand wash, and they want to get great results. There's evidence, Samsung says, that the foam cushion its system creates, and the gentle action involved, has a measurable improvement on garments such as outdoor and water-resistant fabrics, allowing them to keep their coating in good condition and keeping out the rain for longer. □

www.popularmechanics.co.za popularmechanics@ramsaymedia.co.za mobile.popularmechanics.co.za bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook www.youtube.com/user/popmechsa mobile.popularmechanics.co.za twitter.com/popmechsa

DO I MAKE YOUR HEART RACE?

IT WAS PROBABLY ONLY A MATTER OF TIME BEFORE THE FASHION WORLD WAS INVADED BY TECHNOLOGY, BUT IT'S STILL SOMETHING OF A SHOCK TO SEE IT IN ACTION. WOULD YOU BELIEVE GARMENTS THAT BECOME TRANSPARENT IN RESPONSE TO YOUR BEATING HEART?

PICTURE A CROWDED DISCO with strobes flashing, music pounding, and gyrating bodies turning the dance floor into a kaleidoscope of colour and movement. Hold on... are you seeing things? Is that woman's dress becoming transparent? In short, yes.

Dutch artist and innovator Daan Roosegaarde has succeeded in creating garments that react to the wearer's heart rate, becoming more or less transparent. As the man himself tells it, his wearable artworks function as "an exploration of the dynamic relation between architecture, people and technology".

His so-called Intimacy fashion project, exploring the relationship between intimacy and technology, features high-tech garments crafted from opaque "smart" e-foils that become increasingly transparent when subjected to er... close and personal encounters, creating what Roosegaarde describes as "a sensual play of disclosure". He's currently on the lookout for haute couture designers who'd like to develop their own vision using his unusual dressmaking materials. Roosegaarde is no newcomer to avant garde. He's already exhibited at the Tate Modern, the National Museum in Tokyo and the Victoria and Albert Museum in London, and has won the Dutch Design Award and China's Most Successful Design Award. □

'As far as I'm concerned, progress peaked with frozen pizza.'
– *John McClane, leading character in* Die Hard 2

2.0VGT

Get all of this...

GWM Positively driven

4D20 turbo diesel engine, 110 kW at 4000 rpm, 310 Nm at 1800 to 2800 rpm, 17-inch alloy wheels, six gears (manual), five gears (automatic), rear-view mirror auto dimming function with individual tyre pressure monitoring and temperature reading, instant fuel consumption and low battery indicator, airbag disable function, power steering, cruise control (automatic), climate control with pollen filter, electric windows and electronic side mirrors, remote central locking with vehicle search function, six-speaker RDS radio with DVD player/MP3 player/USB/Aux, front and rear fog lights, dual front airbags, door exit lights, reverse park assist camera with audible warnings, front and rear mud flaps, light sensing auto headlights, steering mounted audio controls and Bluetooth, DELPHI electronic management system, leather seats and door inserts, leather-wrapped steering wheel and gear lever knob, driver and passenger lumbar support, centre console touch screen media centre, seatbelt reminder and height adjustment system, adjustable steering column, wide angle side mirrors, rear auxiliary power point, rear demister, 60/40 split rear seats, cargo security cover, 10 tie-down points in rear cargo compartment, map reading lights, tinted side and rear windows for UV protection, full-sized spare wheel, rear centre arm rest with two cup holders, ABS with EBD, airbags and child-seat ISOFIX fixtures, auto-locking of all doors at 15 km/h, side impact safety bars, front pre-tension seatbelts with load limiters and a child safety locking mechanism.

... for this

R249 990*

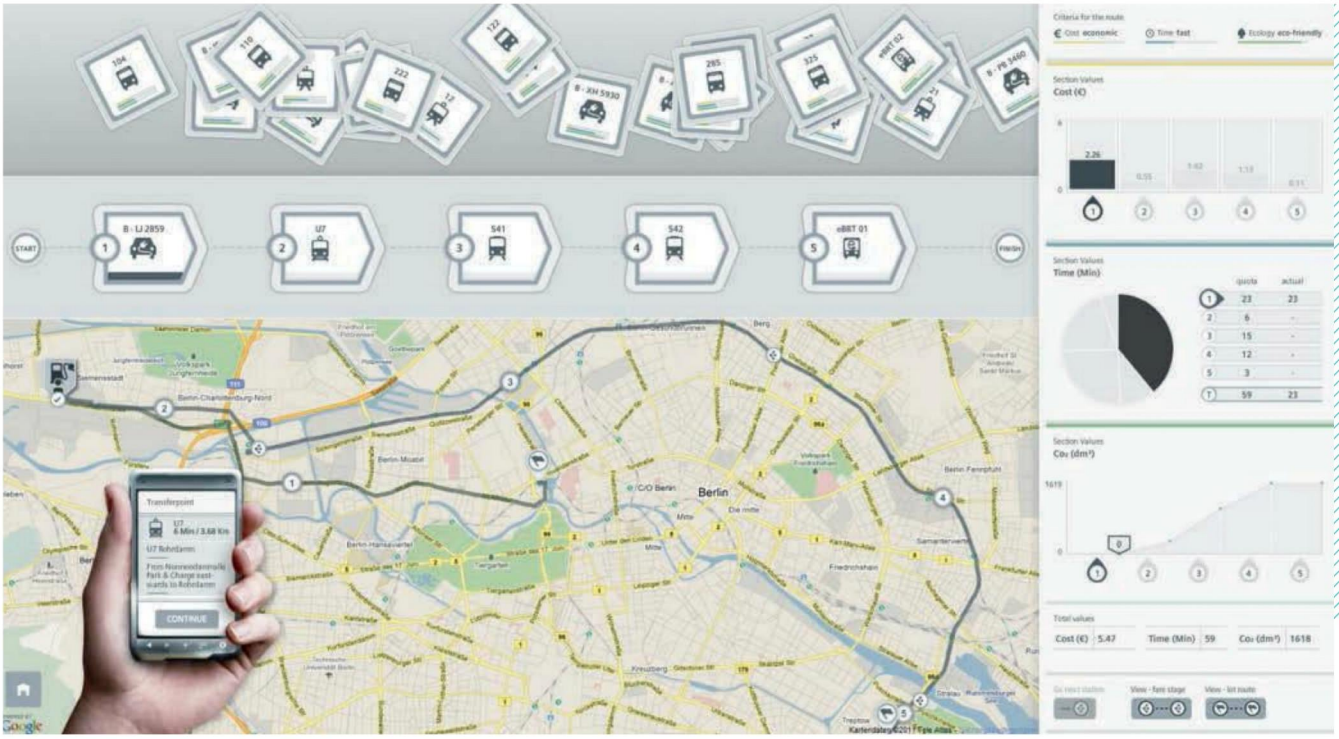
(Automatic now also available)

Test-drive the all-new GWM H5 2.0 VGT Diesel today.

Contact 011 805 6621 or visit www.gwm.co.za for your nearest dealer.

6th Overall Winner at DAKAR 2012

* Price incl.VAT & Environmental Levy.Prices & specifications subject to change without prior notification. E & OE.



FLEXIBILITY IN MOTION

IN THE FUTURE, NETWORKED TRANSPORTATION SYSTEMS AND UP-TO-THE-MINUTE INFORMATION ON THE FASTEST CONNECTIONS WILL HELP CITY DWELLERS REACH THEIR DESTINATIONS WITH EASE, DESPITE RISING TRAFFIC DENSITY. THE CAR WILL STILL BE WITH US IN 2050, BUT IT WILL BE JUST ONE OF MANY MODES OF TRANSPORTATION.
By Hans Schürmann

MARCUS ZWICK IS FEELING UPBEAT. It's late on a Friday afternoon, and the week's work is done. A manager at Siemens, Zwick has just arrived home in a Munich suburb. He is looking forward to attending a soccer match this evening; during his lunch break, he went online and bought a ticket to the game. A quick glance at his smartphone shows he will need to leave within half an hour if he wants to arrive on time for the opening whistle. On his way to the stadium, traffic is still moving smoothly.

As traffic gets heavier, his smartphone steers him across the city – there are still 40 minutes to go before the start of the game. Suddenly, the mobile device on the windshield emits a shrill tone; a voice issues a traffic jam warning and recommends that Zwick park his car and board a commuter train, which will get him to the stadium on time. He touches the display with a fingertip, and the navigation system automatically changes the destination and guides him to the nearest park-and-ride site. On the way, software in the smartphone purchases a ticket, ensuring that Zwick loses no time and can simply take his seat on the train.

Although this scenario is not quite here yet, the day will soon arrive when a mobility app loaded into a smartphone will enable people to travel safely and quickly through cities. Like Marcus Zwick and his colleagues at Siemens, researchers and companies all over the world are working on solutions that can closely network various modes of urban transportation with one another so that they can be intelligently controlled.

The idea behind this is that in order to quickly and effectively get from A to B in the future, people will be guided through urban mazes by intelligent systems. Travellers and commuters won't be limited to just one means of transportation; instead, they'll switch between different modes, depending on traffic conditions, the route in question, and personal preferences – exchanging an electric car for a subway, a commuter train for a rental bike, or linking them all together. The individual systems needed for this are already available. The challenge is to link them intelligently so that they can be more effectively controlled for enhanced utility.

Demand for intelligent, networked transportation systems is growing rapidly. According to the most recent study by Frost & Sullivan, in 2025, about 4,5 billion people will live in cities – that is, one billion more than today, and the equivalent of 60 per cent of the world's population. Worldwide, there are about 30 megacities with populations of over 10 million inhabitants each, as well as conurbations such as Germany's Ruhr region, with their tightly meshed networks of urban centres. Many megaci-

'One machine can do the work of 50 ordinary men. No machine can do the work of one extraordinary man.' – *Elbert Hubbard*

From buses and rental bikes in Denver, to electric cars… with a multi-touch table and a mobility app from Siemens, transportation modes will merge into integrated transport systems.

Siemens Pictures of the Future

ties and conurbations are already suffering from chronic traffic jams, parking space shortages and poor air quality.

Cars: fading status symbols

To ensure that life in most cities continues to be attractive, decision-makers from municipalities are working with mobility providers to find new solutions. For instance, Hans Rat, secretary general of the Brussels-based International Association of Public Transport (UITP), is sure that local public transportation will play a very decisive role in these developments.

Middle Eastern megacities have also recognised this fact. Planners have assigned top priority to integration of the transportation systems in Dubai, for example, where subway lines, buses and marine transport are linked by a growing number of multimodal connection stations. Shuttle bus service is available at all subway stations – even those in outlying areas. Fares can be paid by means of a "smartcard" or a smartphone e-ticket app, making it easier for people to change transportation modes. Instead of having to keep track of fare prices, users pay for the distance they have travelled, and can also use smart technology to pay for parking.

In Europe, according to Professor Stefan Bratzel of the "Centre of Automotive" at the University of Applied Sciences in Bergisch Gladbach, Germany, buses and rail systems are becoming preferred modes of transportation as more and more young people in big cities are choosing not to own cars. In a study titled *Jugend und Automobil 2010 (Young People and the Automobile 2010*), Bratzel and his team surveyed over 1 100 people between the ages of 18 and 25. The results clearly indicated that this group no longer considers the car to be a status symbol.

'BICYCLES AND HIGHLY EFFICIENT, LIGHTWEIGHT ELECTRIC VEHICLES ARE THE NEW STATUS SYMBOLS FOR CITY DWELLERS.'

And surveys conducted since mid-2000 by Professor Peter Kruse, a Bremen-based psychologist, have confirmed this trend. "Mobility used to stand for freedom, and was considered to be a privilege. Today, freedom tends to be expressed through mobile phones rather than with cars," he says. The object of desire and symbol of personal independence is increasingly becoming a down-to-earth tool for mobile functionality. Many consumers subconsciously feel that the car is just one of many forms of transportation.

The same finding was reported by researchers at the Fraunhofer Institute for Systems and Innovation Research in Karlsruhe, Germany. In their study, *Vision of Sustainable Transport in Germany*, they predict that only one out of four inhabitants in big cities will own cars by 2050. "Bicycles and highly efficient, lightweight electric vehicles are the new status symbols for city-dwellers," report the researchers.

Mobility as a service

Carmakers such as BMW and Daimler have been adapting for some time now to their customers' changing desires in terms of mobility. In the future, consumers will want to be able to purchase not only cars, but above all mobility. In addition to car sharing offers for electric cars in cities, such companies are focusing on connections to public transportation systems.

BMW wants to make park-and-ride options more attractive, for example, by means of better signs indicating parking areas and information posted online giving the number of available parking spaces and upcoming train departure times. Daimler is offering not only its car2go service for rentals of its Smart brand cars in the cities of Ulm, Hamburg, Austin and Vancouver, but also a new type of ride sharing that brings together drivers and passengers in near-real time with the help of smartphones or personal computers. This makes it possible for the first time to arrange ride sharing for short trips on the spur of the moment, which could ease urban traffic congestion.

Multi-touch display

The individual elements of smart infrastructures are becoming smarter and smarter, but that's not enough. "The information from traffic systems still needs to be bundled and used for controlling and optimising traffic flows," says Zwick.

That's where Siemens comes in. It's not only a worldwide supplier of traffic infrastructure components – including traffic lights and traffic management systems – but is also developing hardware and software for traffic control systems and information technology solutions for collecting associated data and making it available as new services. For instance, Siemens Innovative Mobility Solutions has developed a multi-touch display that will make it easier for traffic control centre personnel in major cities to gain an overview of growing amounts of information.

The display gathers data from individual traffic and information systems and visualises it for staff. It also simplifies interactions between personnel in different areas of responsibility.

Much of this information will, of course, be available to the public. Their smart devices will give them access to situation updates and allow them to spontaneously opt for an alternative mode of transport – just as Zwick does when he wants to meet friends in the city after the soccer match. A glance at his smartphone display tells him they are in a steakhouse. That's perfect. He's ready for a good meal. A mobility app shows he can be at the restaurant in 30 minutes by subway. Not wanting to make his friends wait for him, he checks the menu and orders in advance. □

www.popularmechanics.co.za popularmechanics@ramsaymedia.co.za mobile.popularmechanics.co.za bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook www.youtube.com/user/popmechsa mobile.popularmechanics.co.za twitter.com/popmechsa

SKY'S THE LIMIT

SKYACTIV technology is an innovative new line-up of engines, transmissions, chassis and bodies that forms the foundation for every new Mazda, starting with the CX-5

There may be many different routes to the same destination. Typically, Mazda has decided to take the route both fun *and* frugal with its breakthrough **SKYACTIV** technology.

An innovative new approach that encompasses Mazda core systems in engines, transmissions, bodies and chassis, **SKYACTIV** is all about efficiencies for the real world. That's the world where the company's trademark "Zoom-Zoom" spirit doesn't have to take a back seat to the needs of planet-friendliness.

South Africa's first taste of **SKYACTIV** will be in the Mazda CX-5. This all-new compact crossover SUV is the first production vehicle to boast a full slate of **SKYACTIV** tech. It offers European benchmark reductions in both fuel consumption and emissions, combined with the exhilarating driving experience Mazda is known for. Here's the remarkable thing: the performance gains were achieved without recourse to alternatives such as turbocharging or hybrid drive.

SKYACTIV concentrates on three key areas:

- Advanced engines with world-beating compression ratios
- Highly efficient transmissions
- Sophisticated lightweight chassis that are outstandingly safe yet agile.

Engines: back to basics

In today's environmentally conscious world, squeezing more performance out of the internal combustion engine without impacting on its green credentials usually involves methods such as downsizing (smaller engine, turbocharged) or electrification (hybrid drive). Mazda opted instead to radically redefine the basics of internal combustion power. It had two significant reasons for doing so: internal combustion is likely to remain the predominant engine technology for the next decade and, because it operates at around 40 per cent efficiency, offers plenty of room for improvement.

The key with a **SKYACTIV** engine is its unusually high compression ratio of between 13,0 and 14,0:1. Conventional petrol engines seldom go above 11,0:1; even high-performance sports cars are around 12,5:1 using special fuel.

Increased compression ratio increases the expansion ratio, allowing the thermal energy to be easily and effectively converted into work. The downside of this is an increased tendency towards harmful "knocking" – abnormal combustion. **SKYACTIV** counters that by using several new technologies, such as piston cavities designed to support ideal combustion, multi-hole injectors that enable precise fuel injection control and a 4-2-1 exhaust system.

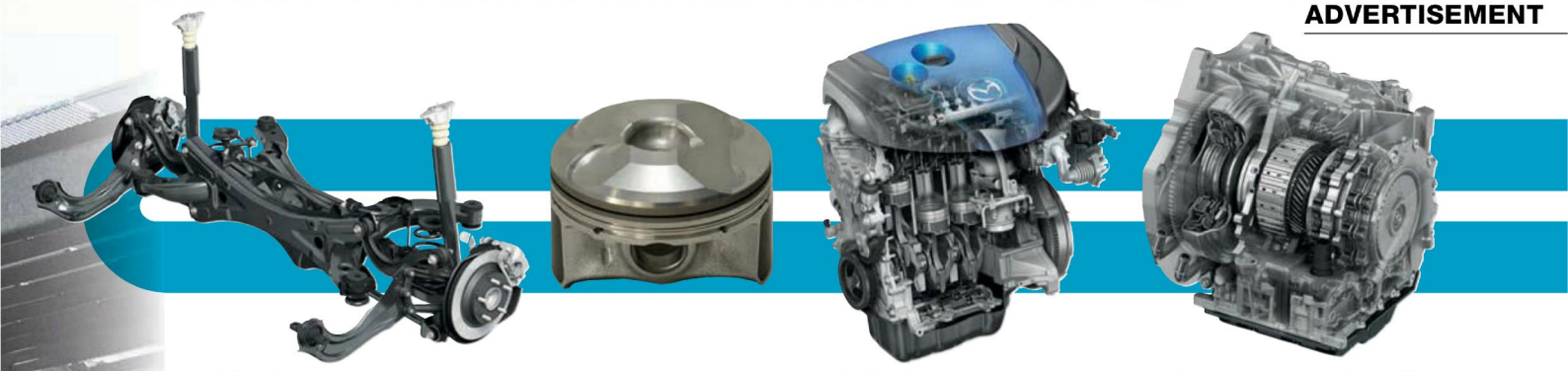
It also mitigates significant engine losses:

- Pumping loss. Close timing of the intake valvegear under low load mitigates pumping loss.
- Mechanical loss. Valvetrain and piston ring friction have been significantly reduced.
- Exhaust loss. A high compression ratio's massive reduction in exhaust loss more than compensates for a 2,0-litre engine's greater cooling loss compared with a smaller turbocharged engine.

In short, Mazda have created an engine that is more efficient over a broader range of operating conditions than previously, providing a vehicle that is light, with good fuel economy and fun to drive. In line with this concept, the **SKYACTIV** engines will continue to make

TOP TECH

The newly developed **SKYACTIV-G** 1.3 engine has been named the 2012 "Technology of the Year" by the Automotive Researchers' and Journalists Conference of Japan (RJC). The breakthrough **SKYACTIV-G** 1.3 achieves a record high compression ratio of 14,0:1 (higher than a Formula One engine's) and outstanding efficiency, especially under high load at low revs.



● Optimised, lightweight suspension.

● Special piston design.

● Massively reduced losses.

● Less weight, smoother shifts.

advances aimed at the ultimate internal combustion engine, supplemented by advanced technology such as the i-stop idle-stop system and regenerative braking to hybrid systems and more.

Transmissions: two for the road

Mazda's drivetrain engineers took the bold decision to develop just two all-new six-speed transmissions to effectively deliver market demands.

The **SKYACTIV**-Drive six-speed lock-up automatic transmission brings together the best attributes of conventional step automatic transmissions, continuously variable transmissions and dual clutch transmissions in one compact and lightweight package. The result is a smooth and highly efficient gearbox that delivers up to 7 per cent better economy along with a direct feel and quick shift pattern. Enthusiastic drivers would approve.

The **SKYACTIV**-MT is a lightweight six-speed manual transmission that has been designed for crisp shifts. Using a common second and third input gear and removing the reverse idle shaft has reduced the number of moving parts and trimmed its overall weight by 3 kg.

Body and chassis: safe as houses, agile as a cat

Engineering economy into a car has typically revolved around a drivetrain designed for economy. Well, besides potentially adding weight and complexity, that is hardly conducive to driving pleasure. Mazda's approach has been to look at the big picture: light weight, ridigity and strength plus add-on economy tech and precision mechanics equals improved economy and greater driving agility.

The new **SKYACTIV**-Body is all about going back to basics. For the record, it is underpinned by a straight and continuous basic framework in which each chassis section functions in a co-ordinated manner with other sections. This networked structure disperses impact forces widely throughout the entire framework. The body itself is 30 per cent stiffer than current Mazdas thanks to a substantial increase in the amount of high-tensile steel and improved welding and bonding.

Of course, stiffness and strength are not just about safety in an impact. By combining rigidity with lightness, Mazda's **SKYACTIV** engineers have enhanced vehicle agility and steering precision.

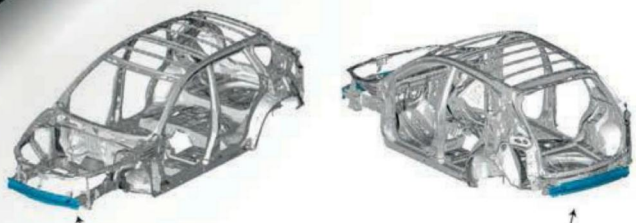
The **SKYACTIV**-Chassis, an impressive 14 per cent lighter than before, features suspension and steering systems that have been redeveloped from scratch. The aim: to reinforce Mazda's trademark driving dynamism while achieving a lower overall weight, benefiting driving dynamics, economy and emissions.

Newly developed front strut and rear multilink suspension with optimally designed linkages and bushes ensures high rigidity and lightness. A new electric power-steering set-up with a higher steering ratio, along with a new lightweight and highly rigid cross member provides exceptional steering precision and feedback.

TOWARDS TOMORROW

Mazda calls its long-term vision for technology development "Sustainable Zoom-Zoom". It goes beyond optimising internal combustion. As detailed above, **SKYACTIV** plugs into Sustainable Zoom-Zoom via lightweight designs and shedding kilograms wherever possible. In fact, Mazda is aiming to make each new model generation 100 kg lighter than its predecessor. The ultimate goal for 2015 is to improve the average fuel efficiency of its global model line-up by 30 per cent relative to 2008 levels.

The Mazda difference: other manufacturers may offer "green" showcase models, but **SKYACTIV** builds ecological soundness into *all* Mazdas. □



Bumper beams made from 1 800 MPa ultra-high tensile steel

WANT TO OUTSMART TRAFFIC?

THEN GET WAZE

This free smartphone app shows traffic congestion in real-time, so you can avoid it.

IF YOU COMMUTE BY CAR, chances are you've often wondered how long you're going to be stuck behind the wheel and, if you have the luxury of other options, which would be the best route to take. Well, here's some good news – the information you require is almost certainly out there and ready to be accessed.

That's where Waze comes in. This free app – available for download on nearly every smartphone platform imaginable – collates travel data from commuters' cellphones to create a picture of how the traffic's behaving in real-time. This information is then displayed on your phone in an easy-to-digest map form, along with audible prompts.

Working much like the free online encyclopaedia, Wikipedia, it encourages community involvement, allowing users to input information on accidents, traffic jams, speed cameras, hazards and the like as they are witnessed. Then, because traffic flow is a dynamic beast, it automatically asks fellow drivers passing the flagged scenes to verify whether they still exist, effectively turning them into forum moderators.

Even if you're not interested in playing an active contributory role, the mere act of driving means you automatically supply valuable information. Evangelos Gikas, product manager for MiX Telematics, Waze's local partner, explains: "If you're travelling along a road with a speed limit of 60 km/h but you're only driving at 20 km/h, the system automatically registers a problem. This is indicated on the map by highlighting the road in various colours to show the level of congestion, ranging from yellow for light to red for heavy and black for gridlocked."

Taking on an active role requires more involvement, but it's by no means an inconvenience. When you witness something relevant, all you need do is hit the icon on your screen and a menu appears, providing you with various pictorial options. The icons then appear on the map for everyone else to see. Gikas elaborates: "You can also type in more detailed messages if you like, but because typing while driving is extremely dangerous, the keyboard function is only activated once you're stationary." When you pass a flagged location, a window appears and asks you if it's still there or not; all that's required is for you to tap a simple *yes* or *no*.

When Gikas took me for a drive into Cape Town from our Pinelands office to demonstrate Waze, I was duly impressed. As we approached the notorious Hospital Bend on the N2, an icon appeared, indicating a hazard. Then, about 200 m ahead, we saw it – a vehicle parked inside the yellow lane. At the same time, I could clearly see which roads were highlighted in red and best avoided. Works for me. – SW

For more information, visit *www.waze.com*

'One machine can do the work of 50 ordinary men. No machine can do the work of one extraordinary man.' – *Elbert Hubbard*

ON YER BIKE. QUICKLY, NOW

GERMAN TUNING COMPANY BRABUS has long been associated with super-quick Mercedes-Benzes (and even those cute little Smart runabouts, would you believe it). But an electric bicycle? Absolutely.

A few weeks ago, the company began taking orders for the strikingly different and relentlessly "green" smart ebike, a two-wheeler offering both excellent environmental credentials and a useful top speed of 45 km/h. It even looks good, for heaven's sake: the frame and fork are painted matt black and other critical bits – such as the pedals and brake callipers – provide a nice contrast in anodised green, the saddle and grips being finished in green leather. A four-piston brake system is fitted to the front wheel, the matt black four-spoke wheels are made of carbon, and the bike weighs about 10 per cent less than the original smart ebike.

With Brabus, however, it's more about power than good looks – and here the smart ebike performs rather well. At 500 watts, the electric motor is twice as powerful as the motor on the original. Not surprisingly, this makes for vigorous performance, the rider deciding how much power to relinquish to the motor via a throttle grip. The production version of the smart ebike is expected at the end of 2012. □

www.popularmechanics.co.za
popularmechanics@ramsaymedia.co.za
mobile.popularmechanics.co.za
bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook
www.youtube.com/user/popmechsa
mobile.popularmechanics.co.za
twitter.com/popmechsa

THE PREDICTIVE QUIZ: WILL YOU BE BUYING A 3D TV?

JOHN CARTER WAS KIND OF COOL. BUT DO YOU REALLY NEED THAT IN YOUR LIVING ROOM? TAKE THIS HANDY QUIZ TO FIND OUT. SELECT YOUR ANSWERS, THEN ADD UP THE ASSIGNED POINTS.

1. Do you watch TV?
Yes (5)
No (-20)

2. A lot?
Yes (10)
No (0)

3. Do you own a home theatre?
Yes (5)
No (0)
Yes, with stadium seating. (15)

4. Do you own a Magic Eye poster?
Yes (10)
No (0)
What the hell is that? (0)

5. Do you suffer from epilepsy?
Yes (-50)
No (0)

6. A good TV should cost:
Less than R3 000 (-10)
Less than R8 000 (-5)
Less than R15 000 (0)
More than your neighbour's (20)

7. Did you stand in line to buy an iPhone or Galaxy Tab?
Yes (10)
No (0)
Why would anyone do that? (-10)

8. Did you stand in line for *Clash of the Titans*?
Yes (10)
No (0)
Why would anyone do that? (-10)

9. Which of the following do you or did you own?
Laser-disc player (5)
DivX player (5)
HD-DVD player (5)
3D Blu-ray player (15)
3D TV (50)

10. There's a big rugby match this weekend. What do you picture yourself wearing?
A jersey (0)
Team-branded socks (0)
Non-prescription eyewear (15)
None of the above (0)

11. Which version of *Avatar* did you see?
Standard cinema (-10)
IMAX (0)
IMAX 3D (10)
DVD (-20)

12. What are these?
Poorly designed sunglasses (-10)
The future! (20)

13. Does the idea of a 3D Sofia Vergara (Colombian actress) appeal to you? No (-5)
Yes (5)
Good heavens, yes (20)

14. Steve Buscemi?
No (-5)
Yes (10)
Good heavens, yes (30)

15. Do you watch mostly sports and action movies?
Yes (5)
No (-5)

16. Do you know the difference between active and passive shutters?
Yes (20)
No (0)
What? (-10)

17. How would you describe the 3D-viewing experience?
Gimmicky (-10)
Cool (5)
Revolutionary (15)
It makes my brain feel funny (-20)

18. Where do you like to sit when you watch TV?
In a very specific prescribed sweet spot, the view from which is greatly superior to that from anywhere else in the room (10)
Wherever's comfortable (-5)

19. Which of the following statements do you agree with?
"3D is a waste of a perfectly good dimension." – Roger Ebert (-10)
"I personally do not want to watch a movie with glasses. It's tiresome." – Francis Ford Coppola (-10)
"3D used in films not aimed at children is like seeing someone you respect trying too hard. Like witnessing your dad in leather trousers." – Simon Pegg (-10)
None of the above (10)

20. Which phrase best summarises your philosophy of life?
Carpe diem (10)
Go big or go home (15)
A penny saved is a penny earned (-15)
Hakuna matata (5)
This, too, shall pass (-25)

ANSWER KEY

MORE THAN 160 POINTS:
You will be buying a 3D TV.

126 to 159:
You will go to the house of a friend who owns one.

90 to 125:
But only if he lives close.

Less than 90:
You will not be buying a 3D TV. □

'Technology is so much fun, but we can drown in our technology. The fog of information can drive out knowledge.' – *Daniel J Boorstin*

celluon
A World of Possibilities at Your Fingertips

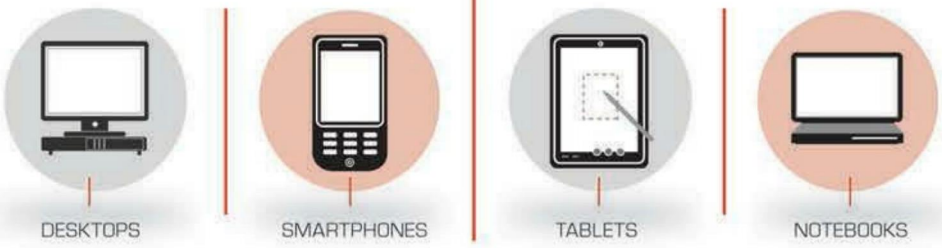
Experience The Magic

With The World's First Laser Keyboard & Mouse.

www.laserkeyboard.co.za

magic cube™

www.laserkeyboard.co.za



Celluon - One Step Ahead

The Celluon Magic Cube is a projection keyboard and multi-touch mouse all in one, easy to use product. It connects effortlessly to any Bluetooth HID devices, including the latest iPhones, iPads and Android devices. You can also easily plug-n-play with Windows and Mac OS devices via USB 2.0. Stay one step ahead with this revolution in mobile input technology.

HI-SPEED USB
Bluetooth

Flexibility, Productivity, Innovation.

Learn more at www.laserkeyboard.co.za

STOCKISTS

digicape Kloppers TAKEALOT.COM digitaldepot LANDMARK COMPUTERS kalahari.com The GADGET Shop

DISTRIBUTED BY

Syntech SA
Specialised IT Hardware Distributor
tel: 086 127 4244 www.syntechsa.co.za

THE HURRIED MAN'S GUIDE TO BUYING A NEW TV

WALKING INTO AN ELECTRONICS STORE CAN BE DAUNTING: 30 TVS, ALL LINED UP NEXT TO ONE ANOTHER, SOUNDLESSLY PLAYING *ICE AGE 2*. ONLINE CAN BE EVEN WORSE. THERE ARE JUST TOO MANY OPTIONS. HERE ARE NINE CRITICAL QUESTIONS ABOUT BUYING A TV THAT, WHILE THEY WON'T MAKE YOUR CHOICE EASY, WILL DEFINITELY MAKE IT EASIER.

PLASMA, LCD, LED, OLED?

Don't bother with OLED. (Whoops! How's that for candour?) OLED TVs are stunning, almost three-dimensionally clear, but they're also ridiculously expensive. And rare. Your first choice is between plasma and LCD. Plasma TVs typically look better in darker rooms, with deeper, more realistic blacks, and their images are less likely to blur with movement.

These TVs also have a wider viewing angle, in case you want to invite a lot of people over. LCDs, however, are less washed out in bright light and are often cheaper and lighter. Thinner, too, if you plan on mounting it on your wall. LEDs are even thinner.

They're very bright, with excellent contrast. They're usually more expensive, too, but they consume less energy, if that's something that concerns you.

WHAT ABOUT CONTRAST RATIO?

Contrast ratio is unregulated, unfortunately, which means one company's 500 000:1 is another's 2 000 000:1. Comparing these numbers really only helps when you're considering two options from the same brand.

I SHOULD JUST GET 1080P, RIGHT?

Yes, but if you're buying a 42-incher (that's around 106 cm, if you insist) or smaller, most people's eyes won't be able to discern the difference in resolution between 1080 and 720. So you can save a little money there.

BUT WHO WANTS A TV UNDER 42 INCHES?

Er… people like us? If money is no object, perhaps it's for the bathroom.

WHAT ABOUT REFRESH RATE?

Refresh rate is the number of times a screen refreshes its image each second, measured in hertz. Sixty Hz is passable, 120 Hz is great, and 240 Hz is overkill, for the most part.

DO I NEED A CERTAIN NUMBER OF HDMI PORTS?

Make sure there are as many HDMI ports as you have peripherals (a Blu-ray player, game system, etc). You're usually safe with three. Whatever you do, don't buy expensive HDMI cables. The ones you can find online for 20 bucks are generally as good as the R600-plus options at the store.

WHAT ABOUT 3D? I WANT THAT, RIGHT?

Might as well, if you don't mind spending the extra money. Who knows if 3D will ever really take off – the glasses are mildly embarrassing and often uncomfortable, and glasses-free 3D viewing, for now at least, can make you feel cross-eyed – but even a mediocre 3D TV will be a fantastic 2D TV. Plasma has the slight edge, as it's less likely to have cross-talk: the appearance of two separate images (right and left eye) instead of one smoothly incorporated image.

WHAT ABOUT THE EXTENDED WARRANTY?

Don't bother. Most TVs, if they're going to have problems, have them in the first year of ownership, when you're protected by the manufacturer's warranty.

WHEN SHOULD I BUY IT?

Right now, before the big rugby games start. □

KNOWING HOW MUCH TO SPEND ON YOUR TV IS EASY. JUST FOLLOW THE EQUATION BELOW.

HOURS OF TV YOU WATCH IN A WEEK

×

ANNUAL INCOME*

÷

1 000

+

2π**

×

(77,9* – YOUR AGE)**

** After taxes.*
*** 3,14. Come on.*
**** Average life expectancy.*

AND THE EXTREMELY HURRIED MAN'S GUIDE TO BUYING A CAMCORDER

DON'T

JUST GET A NICE POINT-AND-SHOOT OR DSLR. MANY OF THEM NOW COME WITH ONE-BUTTON VIDEO CAPTURE, OFTEN IN FULL HD.

'Television is a medium because anything well done is rare.'
– *Fred Allen*

RETRO ROCKS VACUUM TUBES ADD A GLOW TO DIGITAL

DA-E750

VACUUM TUBES – old-timers also call them valves – are as far removed from digital technology as, oh, the Wright brothers are from the space shuttle. But the basic principles underlying flight and sound haven't changed, have they?

So, besides adding a welcome retro glow visually to its new audio dock, Samsung is also punting the warm valve-era glow to the audio emanating from this otherwise up-to-the-minute device that marks the company's first foray into the premium audio dock market in Africa.

Exclusive hybrid technology underlies the Audio Dock with Vacuum Tube Amplifier (model DA-E750). It supports a broad range of Samsung's Galaxy devices and Apple devices including the Galaxy S II, Galaxy Note, Galaxy Player, Galaxy Tab, iPhone and iPad via both docked and wireless connectivity. Its elegant design and high gloss mahogany finish complement the promised superior sound quality.

Salient details include a 100-watt output, 2.1-channel speaker, built-in subwoofer and a wide range of convenience and portability options, supporting wireless audio file playback via AllShare for Samsung Galaxy devices and Airplay for Apple devices or through Bluetooth-enabled devices. In addition to these there are the usual analogue input and a USB port to play audio files directly from a flash drive, music player or portable hard drive – MP3, WMA and WAV file formats are supported.

Similar tube tech is available in the flagship HT-E6750W 7.1 Channel Blu-ray 3D Home Entertainment System. Versatility is this unit's strong suit: compact tower speakers with innovative swivel units facilitate immersive vertical sound experiences, cascading the sound down on the listener, and the wireless tall boy rear satellite speakers eliminate extra wires to offer more flexibility to users. Samsung's vacuum tubes, visible on the top and side of the system, add additional style by illuminating when in use.

But wait, there's more: featuring built-in Wi-Fi, the HT-E6750W provides access to Web-connected entertainment via a full web browser, in addition to signature services from Samsung's Smart Hub, AllShare Play support and hundreds of apps including BBC, CNBC, ESPN and The Broadway Channel. The home theatre system also supports Bluetooth-enabled devices and includes an iPhone/iPod docking cradle.

In fact, for all the emphasis on retro, Samsung is strongly pushing forward-looking technologies in the connectivity area. To provide seamless sharing via wireless devices, its 2012 Blu-ray players such as the BD-ES6000 are DLNA certified and also support Wi-Fi Direct – which eliminates the need for a wireless access point while still enabling a direct connection between a device and Blu-ray player.

And it isn't restricting its devices to its own brand: the DA-E650 dock (not pictured) has dual-docking abilities to connect to both Galaxy smartphones and Apple iOS devices while simultaneously charging the batteries of each device. Don't be fooled by its cute-looking organic horn shape, either. The DA-E650 has power to spare, with a 40-watt output and integrated subwoofer. Connectivity includes Aux, Bluetooth and support for MP3, WMA and WAV files. ☐

BD-ES6000

HT-E6750W

www.popularmechanics.co.za popularmechanics@ramsaymedia.co.za mobile.popularmechanics.co.za bit.ly/popmechsagplus
www.popularmechanics.co.za/facebook www.youtube.com/user/popmechsa mobile.popularmechanics.co.za twitter.com/popmechsa

mantality

Face • Shave • Health • Sex • Gadgets • Scent • Style

SOUTH AFRICA'S ONLY ONE-STOP ONLINE SHOP FOR THE URBAN MAN!

BINARY WATCHES

NOVELTY GIFTS

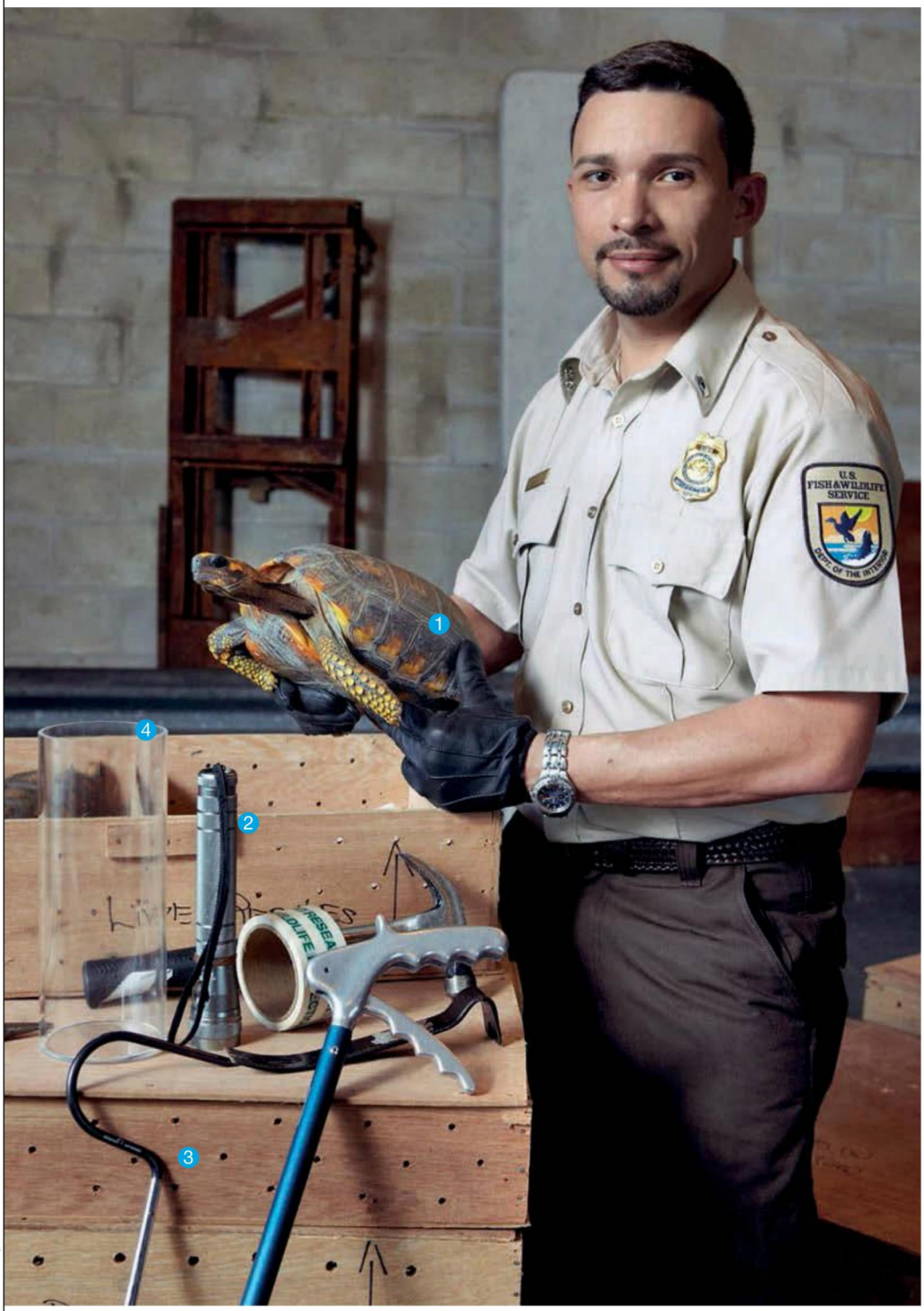
SOLAR & OUTDOOR

SPY & ACTION CAMERAS

We offer the following:

- Unique range of products
- Secure online shopping
- Next day courier delivery
- Collections also welcome
- Card & bank payments

Shop online at www.mantality.biz



Aaron Wojack

Wildlife **INSPECTOR**

Alberto González has a checklist 100 lines long of all the animals he'd like to see. As a wildlife inspector at the Port of Miami, he's already more than halfway through it: He has set eyes on everything from the world's most toxic snake, the taipan, to its biggest shark, the whale shark. The US Fish and Wildlife Service hires inspectors to stop the illegal wildlife trade – at up to R150 billion per year, it's second only to arms and drug smuggling in the black market. "We have to understand and enforce a range of local and international laws, regulations, and treaties that limit the commercial traffic of endangered wildlife. We must be able to identify thousands of different species. And we verify that live animals are transported humanely," González says. "Every day is a new challenge." – *ERIN MCCARTHY*

Name: ALBERTO GONZÁLEZ
Age: 33
Years on job: 6

1. LIVE ANIMALS

During PM's visit, González inspected shipments of green anacondas, Goliath bird-eater tarantulas, smooth-fronted caimans, and yellow-footed tortoises (left). "With the exception of the tarantula, all the animals are protected by CITES – the Convention on International Trade in Endangered Species," he says. "Not all the animals are endangered, but CITES regulates their trade to prevent them from going extinct." The biggest challenge is identification: "Species from the same genus can look alike except for one detail. One is protected, the other is not."

2. TORCH

Wildlife is shipped in bags or containers placed in crates. González dons a pair of Kevlar-lined gloves, then shines a torch inside the box to check for loose animals – such as the monitor lizards he recently found at large. "If we can handle the animal, then we'll try to catch it," he says. "If not, we close the box, contact the importer, and let them do it."

3. SNAKE HOOK

In 2011, more than 36,8 million animals were imported and exported through Miami, which receives more venomous animals than any other port in the US – at least 16 000 last year – so snake hooks are essential. The inspectors relocate such shipments to a large room. "We don't want to be in a confined space in case the animals get loose," González says. "We want to have an open area where we can handle them with the hooks if necessary."

4. VIEWING TUBE

After a bag has been placed on the floor, inspectors insert a plexiglas viewing tube to see what's inside. Sometimes bags are mislabelled (by accident or on purpose), such as the one González peeped into that should have held frogs. The viewing tube showed its actual contents – scorpions – from a safe distance. PM

ON THE WEB > Visit *www.popularmechanics.co.za* to read about Jay Leno's seven Duesenbergs (search keyword: Duesenbergs).

GREAT VEHICLES NEVER DIE; THEY JUST KEEP GETTING FIXED. SAY HELLO TO THE MECHANICS WHO SHOW LOVE TO CARS THAT MANUFACTURERS HAVE LONG ABANDONED.

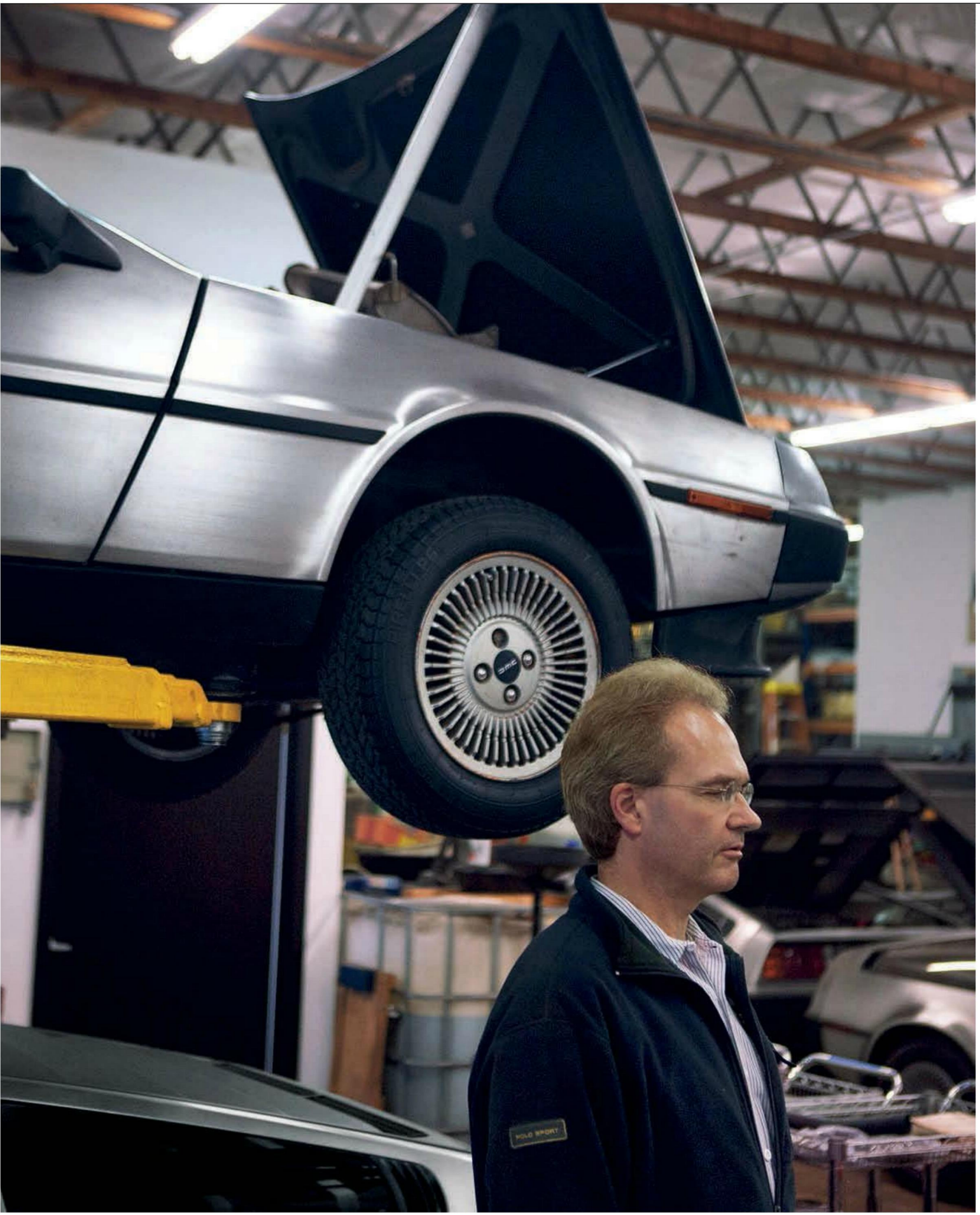
By EZRA DYER ♦ Pictures by MATHIEU YOUNG ♦ Illustration by TIM BOELAARS

I COULD TELL YOU THE LOCATION of Randy Ema's Duesenberg garage, but then I'd have to... well, actually, I couldn't even really tell you where it is. I'm standing right outside, and I need to call Ema to verify I'm in the right place because there's no sign indicating that this nondescript Los Angeles industrial building houses the world's premier Duesenberg restoration workshop. When you're working on cars that sell for millions of dollars, discretion is the order of the day.

Ema belongs to a rare sect of mechanical specialists whose passion is devoted to a single esoteric vehicle. Most mechanics are generalists, but a handful of gearheads catch a fever for a particular machine out on the fringe and cultivate their expertise and resources until they become The Guy for that car. Temples of automotive obsession exist all over the country, populated by diehards who stoke the fire for Lancias or Studebakers or Mercedes-Benz Pullman limos. Ema's shop is my embarkation point for a 2 000-kilometre pilgrimage up the US West Coast to meet some of these characters and learn exactly how one becomes a nationally recognised authority on Duesenbergs, or the DeLorean DMC-12, or a GMC motorhome produced for five years in the 1970s. Because that last one in particular seems like a career path your high school guidance counsellor most certainly would have recommended against.

If you're going to visit artisans of quirky and anachronistic auto engineering, you need an appropriately contrarian vehicle, so I borrowed a 2011 Mazda RX-8 for the trip. Mazda will halt production of the RX-8 after this model year, making it the last car to use a

Toby Peterson, owner of DeLorean Northwest, has a background in aviation engineering but has switched careers to work exclusively on the repair and maintenance of the iconic '80s sports car.



rotary engine. So if you own one of these Mazdas in 2032, you'll need to know someone who speaks the language of rotors and ports instead of pistons and valves. You'll need The Guy. But before you can enlist the help of one of these automotive shamans, you'll need to find him.

THE DUESY DOCTOR

Stepping through Ema's door is like entering Santa's workshop – if Santa had a serious thing for high-end antique cars. In one room, a draughting table holds a blueprint for some extinct part that's about to be reconstituted by Ema's craftsmen. In an adjacent room, a Bugatti motor sits on the floor next to a display case filled with old toy cars. Once you get past the museum-quality distractions out front – hey, is that a set of Duesenberg headers just hanging on the wall? – you're into the real action: the garage. Ema takes a photo of each car he's restored, and a far corner of the garage is wallpapered with snapshots of projects past.

Duesenbergs belong to a rarified league of automobiles. Founded in Des Moines, Iowa, in 1913 by brothers Friedrich and August Duesenberg, the company that bore their name created hand-built luxury performance cars on and off for 24 years. If you're lucky enough to own a Duesenberg (fewer than 1 200 were made), Ema is the last word.

"I'm a historian," Ema says as we make our way toward the back of the shop. "History is a passion for me and has been since I was a little kid. I like an original piece because it's only original once."

Ema's never felt an urge to put his own riff on what the factories wrought, but one corner of his garage houses a personal project that allows some leeway for creative interpretation. "This is my hot rod," Ema says. "It's a '22 Duesenberg, but prior to 1934 someone cut the chassis and put a '28 Chrysler body on it." Today, fusing a Duesenberg and a Chrysler would constitute aesthetic and financial madness, but the chronological distance of that strange decision gives the car its own interesting story. And for Ema, that connects it spiritually to other Duesenbergs – each car was a reflection of its owner. Each car has a story.

"Nothing has come up to the standards of a Duesenberg," Ema says. "No two cars are the same. You have this wonderful high-performance chassis and the body of your choice. Even today, they're fast." Supercharged Duesenberg Model Js could top 200 km/h, making them the Bugatti Veyrons of their era and a high-water mark for the American car industry.

There are 378 Model Js still in existence and Ema has laid eyes on all but three. There's one Model A he hasn't seen and it's in Australia. Ema maintains a stash of original drawings, patterns and blueprints, which he uses to create more than 1 000 different parts to keep the world's Duesenbergs on the road. For all practical purposes, Randy Ema is Duesenberg, circa 2012.

Although Ema's workshop could keep me entertained all day, I've got an appointment with another enthusiast almost 7 hours distant in San Francisco. The object of Jim Kanomata's expertise is certainly less exotic than a Duesy, but his affection for a very specific machine – the 1973 to 1978 GMC recreational vehicle – makes him a kindred

SHOP: RANDY EMA, INC. **LOCATION:** ORANGE, CALIFORNIA
OBSESSION: DUESENBERGS

The Duesenberg Automobile and Motors Company produced some of the most luxurious cars of the early 20th century, but couldn't survive the Great Depression. Randy Ema owns 28 000 of the company's original drawings, so he can produce brand-new parts for cars that are more than 75-years old.

The garage of Randy Ema (right) is like a museum filled with artefacts from a golden age of American cars – but it isn't without its oddities. On jacks (above) is a mongrel Duesenberg that someone saw fit to mate to a Chrysler body long ago.

SHOP: APPLIED GMC **LOCATION:** NEWARK, CALIFORNIA
OBSESSION: GMC MOTORHOMES

When it comes to GMC RVs, Jim Kanomata is a fixer and a fan. He has owned three of the lumbering 1970s icons and restored or rebuilt hundreds. Mechanically, he's the opposite of a purist. "I don't get righteous when people want to do something non-stock," he says.

spirit. So I bid farewell, fire up the RX-8, and merge on to I-5 north accompanied by the hard-edged, 9 000-r/min song of America's last rotary.

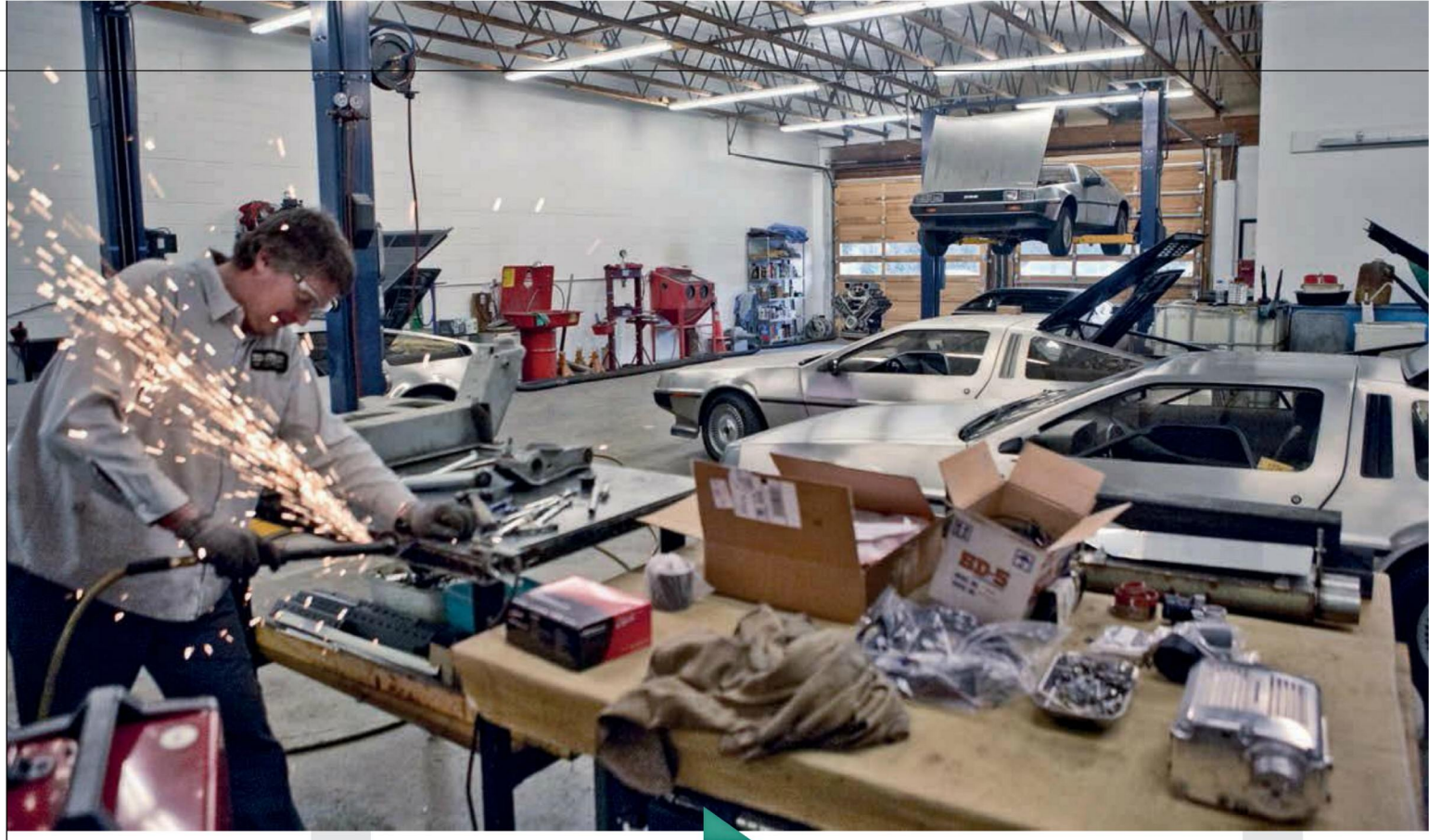
THE MOTOR COACHMAN

My drive to San Francisco, confined to the highway, doesn't afford much opportunity to explore the talents of the Mazda's chassis. The rotary's compact size and light weight allow for sublimely lithe and balanced handling. So when I miss the final turn for Kanomata's garage, I switch off the stability control and indulge in a wide, arcing drift in the empty parking lot of the adjacent business, which happens to be the now-defunct Solyndra solar campus. Solyndra may have bet the wrong way on solar panels, but its empty parking lot is excellent for doughnuts.

When I finally find the headquarters for Kanomata's business, Applied GMC, I discover rows of RVs crowding the back of the building. Some are customer vehicles awaiting repair; others are sacrificial parts donors. A spare-tyre cover reads, "I've been bitten by the GMC motorhome bug." A faded licence plate bears the tag SNLBLZR, a reference to the leisurely acceleration provided by the stock Oldsmobile powertrain.

Even in the world of recreational vehicles, the GMC motorhome is a seriously odd duck. It lacks the shiny nostalgio-futurism of classic Airstream trailers and never achieved the name-brand cachet of RVs from Winnebago. The GMC motorhome will forever be a child of the 1970s, with an anachronistic style and mechanical logic all its own.

Kanomata was bitten by the GMC bug in 1980, when he bought his first motor coach. Over the next 15 years, he figures he covered a million kilometres. "I had to sell it because (of the mileage)," Kanomata says. His second RV reached 600 000 km before the motor – a non-stock 9-litre twin-turbo intercooled Cadillac V8 – asked for a vacation of its own. With all



SHOP: DELOREAN NORTHWEST **LOCATION:** BELLEVUE, WASHINGTON
OBSESSION: DELOREAN DMC-12

Surprisingly, workshop owner Toby Peterson is not as sick of *Back to the Future* jokes as you might think. He's even been known to work on flux capacitors.

that wheel time, you'd think that the GMC motor coach would hold no more surprises for Jim Kanomata. But when you're dealing with a machine that combines the attributes of an Oldsmobile Toronado with those of a small house, the intrigue never dies. "You think that when you've put a million on it, you've figured out all the things that can go wrong. Well, you always find something," he says.

Kanomata's ascension to GMC authority was not exactly preordained. "It wasn't my intent," he says. "I wasn't happy with the performance mine was giving me. I started tinkering with the gears and then started selling them. Pretty soon I got a reputation as the guy who took care of problems."

Kanomata estimates that there are 5 000 to 8 000 GMCs still on the road, enough to keep him busy without working on vehicles that he deems SOBs – Some Other Brand. SOBs, in Kanomata's estimation, are trucks with boxes bolted to the back. The GMC's appeal is rooted in the fact that it was built to its mission from the ground up, bucking RV convention in favour of front-wheel drive and tandem rear axles. Not that GM didn't leave some room for improvement.

"We believe in anything that'll make it operate a little bit better, like fuel injection or disc brakes," says Kanomata, whose background is in aerodynamic engineering. Kanomata relishes pushing the limits of RV performance, whether via a 450-kW Caddy V8 or heavy-duty stabiliser bars. He was once pulled over in his motorhome for going 150 km/h, and that was before he added the turbochargers. "My wife doesn't put china in the cabinets anymore," he says.

THE MAN OF STAINLESS STEEL

My next destination, DeLorean Motor Company Northwest, lies about 2 000 km north of San Francisco, which gives me plenty of time to contemplate the RX-8. The car is a magnet for rotary fanatics. While gassing up en route, a guy on the opposite side of the pumps tells me that he once owned a 1984 RX-7. When I ask if he ever had to work on it, he replies, "No, that's why I loved it!" before adding the rather Zen pronouncement "It wasn't fast, but it was quick."

I think I know what he means. The RX-8 is a back-road scalpel rather than a drag-racing blunt instrument. It's the kind of

car that encourages you to get off the highway and find a string of corners where you can drop down a gear and pitch that rear-wheel-drive chassis toward an apex or two. And that's what I do in northern Oregon, catching the attention of a freight-train conductor traversing a raised trestle above the road. He waves and I wave back with my right hand, which is off the wheel because I'm busy shifting. In the RX-8, you're always busy shifting.

The knock on the Wankel engine is that its novelty doesn't justify its drawbacks – mainly, its prodigious thirst for fuel (on the highway, I average 12 litres/100 km). The rotary was born from technical innovation, but at this point it's more a signifier of free thinking. Sort of like gullwing doors or stainless-steel body panels.

DeLorean Northwest, just outside Seattle, isn't evident from the street – I'm detecting a theme here – but when I find it, I'm struck that this could be what a working DeLorean dealership might have looked like before the original company went under in 1982. A garage packed with cars awaiting service is flanked by a showroom where a pair of DMC-12s (the only model the company ever produced) beckons potential buyers. Even the official DMC sign outside is from an original dealership. Fans of a certain movie franchise might be tempted to ask: when are we?

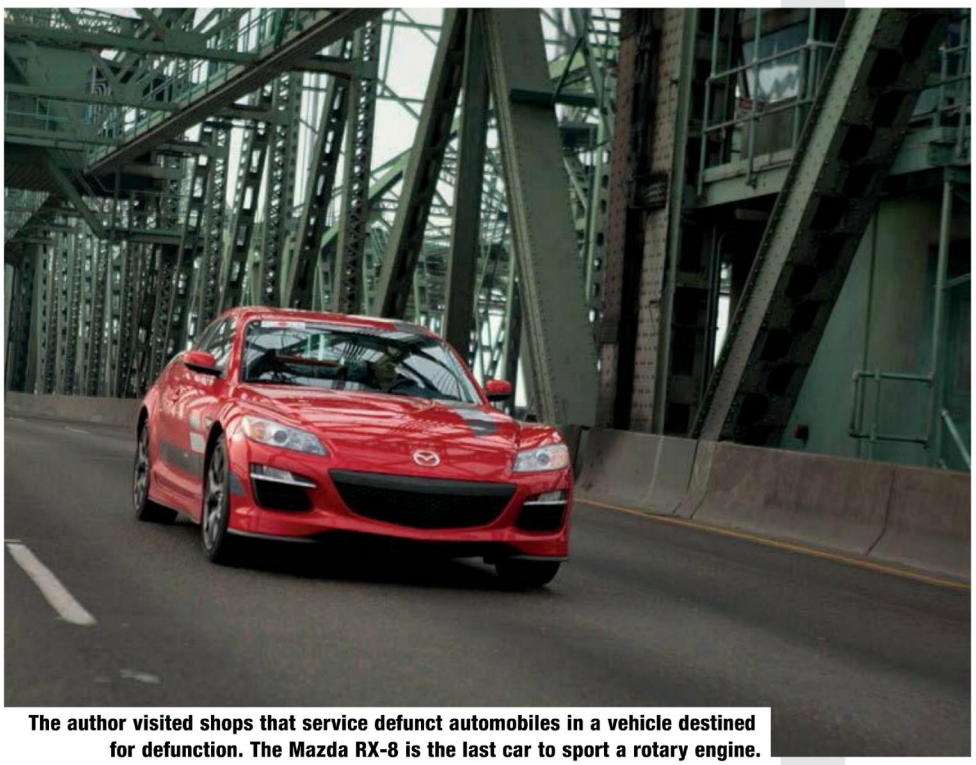
Toby Peterson didn't have a grand plan to build a business around his favourite vehicle. But once he bought a DeLorean, the car steadily began to play a larger role in his life. "My wife and I were looking for a sports car in the late '80s," he says. "We found a DeLorean that was a basket case. Well, I'm one of those guys who goes to the pound and wants to save all the dogs, so of course I bought it."

At Boeing, Peterson was a principal structural engineer on the 747. Which put him in a good position to investigate the failure points of his new four-wheeled acquisition. When a trailing-arm bolt sheared, he put it under an electron microscope for a fatigue analysis. It turned out the bolts had a flaw, a type of corrosion pitting that would eventually lead to disaster. "I'm able to get the best fasteners that man can produce, so I began making improved trailing-arm bolts in 1999," Peterson says. He began solving not just his own DeLorean problems, but everyone else's too. In 2006, Peterson traded wings for gullwings, retiring from Boeing to open DeLorean Northwest.

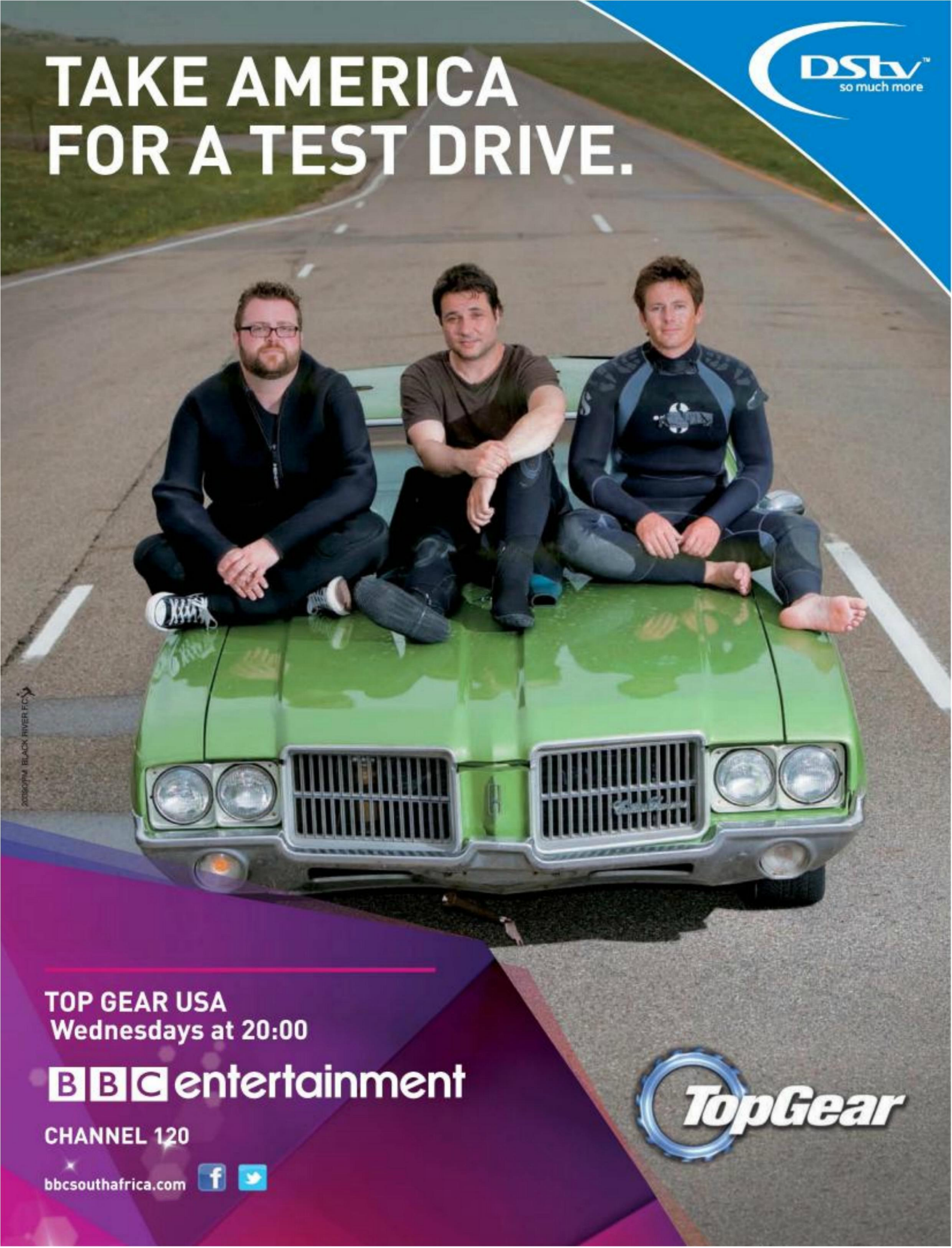
John Z DeLorean himself would applaud the chutzpah of a business built around a defunct company that never made many cars in the first place – about 9 300 DMC-12s left the factory. But those cars have a high survival rate, thanks to their stainless-steel bodies and the publicity generated by the *Back to the Future* movie trilogy. When Peterson held his grand opening, 25 cars showed up. Ten stayed behind for work.

And once you've got your DeLorean running, you'll probably be tempted to enhance its performance. "The Peugeot-Renault V6 is like the small-block Chevy of Europe," Peterson says. "There are lots of performance parts available for it." One customer car is awaiting a supercharger, and when we step outside to fire it up, we find a mechanic from a shop next door eyeing the RX-8. It turns out that he's a former Mazda salesman who sold the first RX-8 in North America. "A guy came in six months before the car was available and put down a $10 000 deposit," he says. Mazda says it's committed to continuing development of the rotary engine, but it's possible that the 2011 RX-8 is the Wankel's last chance to power a new car. As the years go by, mechanics devoted to the rotary will become a rare breed.

"I know a guy who races an old RX-7," the mechanic says. "Because the rotary is so compact, he rebuilds it on his kitchen table." Mazda's rotary might be far more prolific than the DeLorean DMC-12, the GMC motorhome, or the Duesenberg Model J, but it's similar in kind, an esoteric offshoot of automotive history that attracts a passionate following. That's a brand of devotion that Peterson, Kanomata, and Ema would probably understand. "I bought the car to save it," Peterson says. "And it ended up taking over my life." PM



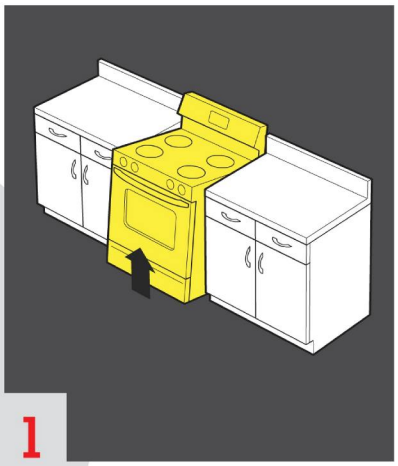
The author visited shops that service defunct automobiles in a vehicle destined for defunction. The Mazda RX-8 is the last car to sport a rotary engine.


TAKE AMERICA
FOR A TEST DRIVE.
DStv
so much more
TOP GEAR USA
Wednesdays at 20:00
BBC entertainment
CHANNEL 120
bbcsouthafrica.com
TopGear

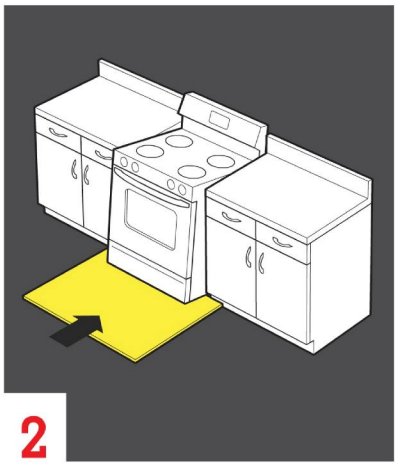
DIY HOME Q+A

> BY ROY BERENDSOHN

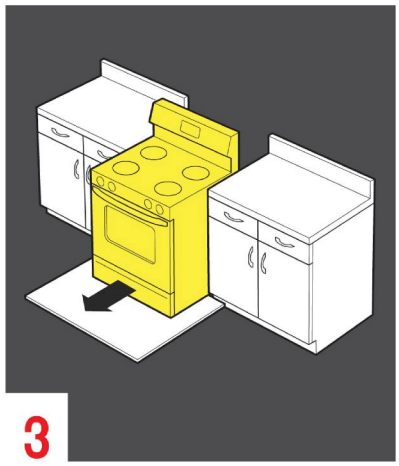
THE ELECTRIC SLIDE



LIFT UP front feet of stove.



SLIDE hardboard under front feet.



LIFT stove and SLIDE it forward.

MAKE YOUR MOVE

Q I'm remodelling our kitchen, one bathroom and the laundry room. While moving appliances around, I damaged our vinyl floors in two different places. I hid the laundry room tear by slightly repositioning the washing machine, but the damage in the kitchen is still visible. First, how can I fix the flooring? Second, how should I move appliances next time?

A Small repairs to vinyl floors are relatively easy to fix with a kit. You can buy a pro-quality kit from a flooring supplies firm for less than R100. For future moving jobs, keep in mind that a dirty floor is a damaged floor. Dirt and grit under the foot of an appliance can increase the friction enough to rip vinyl pretty easily. So the first step in rearranging appliances is to damp-mop the floor. When it's dry, lay down a piece of thick hardboard (often referred to as Masonite), shiny side up.

Lift or lever the appliance and lower it on to the hardboard, then gently coax the appliance forward. For really heavy machines, slip a furniture glide under the front feet once you get the appliance on to the hardboard. Slide the appliance forward and place two glides under the back feet.

Can you move an appliance using the furniture glides alone? Maybe. I once flipped a scrap of carpet upside down and moved a stove around like nobody's business. (That method depends on the quality of the carpet. If an appliance foot punches through, it could wreck the floor.) Given that a half-sheet of hardboard costs very little, it's inexpensive insurance.

Here's a final point. Vinyl floors are especially prone to damage from pivoting, which causes the appliance feet to grind into the surface. So avoid that motion as much as possible.

START DIGGING...

Q The sink and the toilet in one of our bathrooms don't seem to be draining properly, and I've noticed a mushy spot in the backyard, between the house and the septic tank. I'm thinking that the pipe is clogged or broken, but give me your take on this.

A My take is that you're right. The pipe between the bathroom and the septic tank is cracked, broken or infiltrated by tree roots. Any type of sewer pipe (cast iron, asphalt-impregnated fibre or clay) can fail after decades of use, although, generally speaking, cast iron and clay are far more durable than the asphalt-impregnated fibre.

There's no easy repair. If the pipe is cast iron, you can cut out the damaged section and splice in a new piece of cast-iron pipe and no-hub fittings (fittings with large, bolt-on rubber gaskets that seal the joint and prevent leaks while maintaining flexibility). You'll need to rent a special tool to cut the cast-iron pipe, though. The most important piece of equipment will be a soil-pipe cutter (also called a snap cutter).

If the pipe is clay or asphalt-impregnated fibre, you should replace the entire run of pipe from the house to the septic tank. Unless you're an accomplished do-it-yourselfer, hire a plumber to do this, and maybe a couple of labourers to tackle the heavy digging.

One word of advice: if you're brave enough to make this dirty, smelly repair yourself, be sure that no one in the house drains a sink, takes a shower or runs a dishwasher while you're down in the hole – not to mention flushing a toilet.

YANKEE DANDY

Q A friend gave me a box of old tools, including a pair of Yankee screwdrivers (also known as a spiral ratchet driver) that are in pretty good shape. Are the Yankees worth bothering with? I see there are adapters that enable them to take hex-shank bits, but I already own a good cordless drill with two batteries.

A Developed around the turn of the last century, the Yankee was the original powered screwdriver – powered, that is, by you. Push down on its handle and the tool converts your downward force to torque by means of a spring-loaded spiral driveshaft that telescopes into the screwdriver's long, hollow barrel. You can also lock the drive mechanism and use the Yankee as a large ratcheting screwdriver.

That's how I use mine. The design is ingenious, and the tool enjoyed decades of success until it was supplanted by the cordless drill driver. The problem with a Yankee is that its range is limited. It works best with small screws driven into a precisely bored hole. For example, I just used mine to partially back out and re-drive the mounting screws for six hard-wired smoke detectors that I replaced. I find the tool works well for some oddball jobs where space is limited and you need precision.

Still, is it worth carrying in your tool kit? Maybe. If you have a sentimental streak like me, you might want to keep one. I recently restored a Yankee with my teenage son, Joe. It was owned by his great-grandfather, a Popular Mechanics reader and a highly competent self-trained craftsman who did everything from repair his boat to fix his car. Restoring that tool made me appreciate the one I own, so I bought an adaptor for it. Now I use the Yankee a couple of times a year.

In most cases, though, there's no contest between that tool and a cordless drill driver when it comes to versatility, speed, power and precision. The chief benefit of a drill driver is that it is just as effective at boring holes as it is at driving screws. And, of course, just the opposite is true of the Yankee: it's far better at driving than drilling.

HELPING MOM

Q My mom has an aluminium awning over her patio. Rainwater runs down to the awning's edge to a channel and then into downpipes. The channel gets clogged with leaves and then water overflows rather than going into the downpipes. What's the solution?

A I'd make a cover for the channel out of galvanised-steel mesh. Fold the mesh into a V shape and make mesh flaps to cover the ends. Also, make sure to keep the awning clear of leaves by occasionally sweeping over it with a small electric leaf blower. Finally, it sounds like some tree-branch trimming is in order. That should help, at least a little.

FAN CLUBBED

Q We're fixing up our old house, and one of the first fixes I want to make is to stop the upstairs bathroom fan from discharging into the space between the roof and ceiling. When the fan is off, condensation drips from it into the room below. As a stop-gap measure, I think I'll just leave the fan running to increase airflow from the bathroom and out of the attic vents. Will this work to reduce the condensation problem?

A It might stop the dripping condensation, but a bath fan isn't designed to run non-stop. It's a little-known fact that overheated bath fans are frequently the source of house fires. They're often badly installed, clogged with lint and dust, or simply overworked. People let them run to provide constant air circulation, but they're not built to handle such use, and this can lead to overheating. In fact, two recent fires near me have been traced to overheated bath fans.

The solution to your problem is to install a proper exit for the fan, either through the roof or through a sidewall. You'll probably also want to replace the fan itself. I'm willing to bet it's worn out from all that condensation. If nothing else, remove the fan and give it a thorough cleaning.

Finally, as part of this project, have a careful look around the roof space. If the fan has been discharging warm, moist air up there for a while, you may find spots of mildew growth – a problem you'll need to address separately.

EYES WIDE SHUT?

Q I'm trying my hand at arc welding, and I'm not inclined to spend big bucks on one of those auto-darkening helmets. Can I use a pair of good sunglasses, or is this a false economy?

A Economy has nothing to do with it; you'd be risking permanent damage to your eyesight with even a brief exposure. Arc welders produce the full spectrum of ultraviolet radiation, and that's very bad news for unprotected eyes (and exposed skin, for that matter). You can buy a basic flip-up helmet for less than R100, or spend a bit more (probably R350 and up) on the auto-darkening type; just do it. Sunglasses? No, a thousand times no. **PM**

PopularMechanics.co.za

SPOT THE FOCUS

If you aren't already a PM subscriber, you really should take advantage of our latest subscription offer – subscribe to the magazine at only R270 for 12 issues and stand to win a Ford Focus 1.6 Trend worth R233 290, a RoadHawk DC-1 vehicle black box camera system, and a Parrot MKi9200 Bluetooth hands-free system from TruBlue.

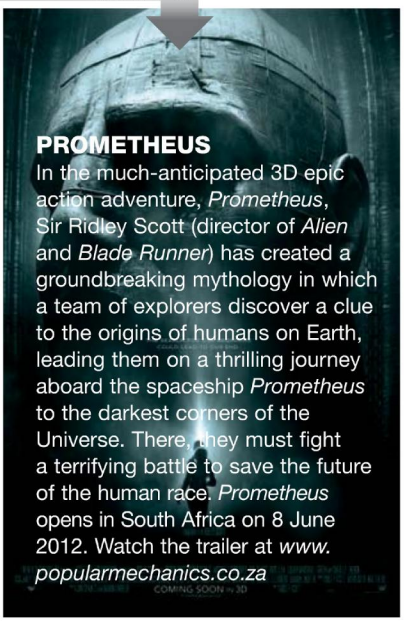
The prize Focus has been stylishly (and temporarily) wrapped in PM branding, and is being used at Popular Mechanics' discretion for promotional purposes and selected editorial assignments during the campaign period (March to August 2012). Currently, the Focus can be seen around Cape Town, and on 21 May it will be driven up to Johannesburg. It will come back to Cape Town on 28 May.

Look out for the specially branded Focus. If you spot it, take your picture with the car and upload it to PM's Facebook Page at ***facebook.com/PopularMechanicsSA*** via the competition app.

Spot prizes will be awarded to fans who upload their photos. We also need you to vote for your favourite snapshots – voters will win spot prizes.

The competition ends at midnight on 31 August, and PM's editors will choose the overall winner on 1 September. The winner receives a 7" Wi-Fi Wise Touch Tablet and HUAWEI E5832 Wi-Fi Modem worth R2 990. The number of votes will be taken into account but is not the deciding factor.

TRAILER



PROMETHEUS

In the much-anticipated 3D epic action adventure, *Prometheus*, Sir Ridley Scott (director of *Alien* and *Blade Runner*) has created a groundbreaking mythology in which a team of explorers discover a clue to the origins of humans on Earth, leading them on a thrilling journey aboard the spaceship *Prometheus* to the darkest corners of the Universe. There, they must fight a terrifying battle to save the future of the human race. *Prometheus* opens in South Africa on 8 June 2012. Watch the trailer at *www.popularmechanics.co.za*

WALLPAPER

View the wallpaper collection on *www.popularmechanics.co.za*, download your favourites and set them as your desktop background.

PM DAILY

We recommend that you waste no time in downloading the *PM Daily* app to keep up with the latest events and discoveries via our daily sci-tech news service. Enter our regular competitions, browse our "Image of the Week" gallery and watch videos to your heart's content. It's available from the **Nokia Ovi Store** and **Apple's iTunes App Store**.

COMPETITIONS

*Visit **www.popularmechanics.co.za** to enter our competitions:*

Stand to win a mini **Big Green Egg** – a complete outdoor-kitchen-in-one worth over **R4 000**.

Looking for a way to monitor or control equipment around your home or business? Then the **SMS Commander** – a programmable SMS controller – is for you. We're giving away **five** units, each worth over **R1 300**.

The **Uniross Power Pod** is capable of charging up to six gadgets at a time and comes with 10 interchangeable tips. Want one? We're giving away **three** units valued at **R399** each.

Gum Plus is a stylish portable backup battery for the iPod, iPhone, iPad and USB-powered devices. We're giving you the chance to win **one of two** units.

Win **one of three** **Ampro toolboxes**, each worth **R1 000**.

Stand to win **a pair** of **David Green Leaf RX** frames worth **R1 500** each.

The telltale house

Whether your house is haunted by poor construction or something spookier, grab a hammer.

> BY ROY BERENDSOHN

Every house has secrets. Doors open or shut themselves. Lights flicker randomly. A toilet flushes on its own. And there's that deathly odour. You've been catching whiffs of it for years now, but you still can't seem to locate the source.

Sorry, but your house is creepy. Even if you don't believe in ghosts, the noises you hear in the dead of night still give you the heebie-jeebies. At the very least, you feel conflicted: you love your place, of course – but it really bothers you that it does stuff that you just can't explain. Here at POPULAR MECHANICS, we call it SHS (spooky-house syndrome).

Rich Robbins, associate dean of the College of Arts and Sciences at Bucknell University in Lewisburg, Pennsylvania, is something of an expert on the subject. Each October, his lecture "Ghosts and hauntings: decide for yourself" draws a standing-room-only crowd. "We carry a prototype in our mind of what a house should be like," says Robbins, who holds a doctorate in social psychology. "When something out of the ordinary happens, we may or may not seek to explain it in rational terms."

Robbins says he's "agnostic" about ghosts; he's never seen one, but can't disprove them, either. At PM, we're a bit more matter-of-fact. When things go bump in the night, we reach for our toolbox and get to work.

Getty images

A GHASTLY STINK FROM THE SINK

You keep a tidy bathroom, so why does it smell as if a rat is buried beneath the washbasin?

Possibility

An awful thing took place in there – think shower scene from *Psycho* – and an olfactory trace of the event remains.

More likely

The sink trap is dry. Normally, it's filled with water, a simple and effective barrier to odours from the building's plumbing or the sewer system. But if the drain system has been badly designed or poorly installed, or the vent stack on the roof is plugged with leaves and sticks, the result is the same: draining water creates a vacuum and sucks the trap dry. Another stink source may be the sink's overflow hole. The interior cavity leading from the overflow to the drain can become black with nasty-smelling slime.

The fix

Getting the drain to work properly may involve re-plumbing it and the vent system, but the remedy could also be as simple as clearing the vent stack with a length of wire or a plumber's snake. To make slime disappear from the overflow channel, flush it out with a cleaner that contains bleach or a mildew killer.

Illustrations by John Hendrix, Photographs by Studio D

WHO SHUT OFF THE LIGHTS?

Bulbs flicker menacingly. An electrical short crackles. There's a persistent but vague smell of burning plastic. Then – gulp – everything goes dark.

Possibility

After William Shatner plugged it with a revolver, the carpet-covered monster from the famous *Twilight Zone* episode dropped off the plane's wing and landed in your utility room, where the beast has been chewing on the wiring in your electrical panel.

More likely

There are dozens of reasons why lights flicker, outlets go dead and circuit breakers trip – none of them good, some of them dangerous. A few of the common problems:

1

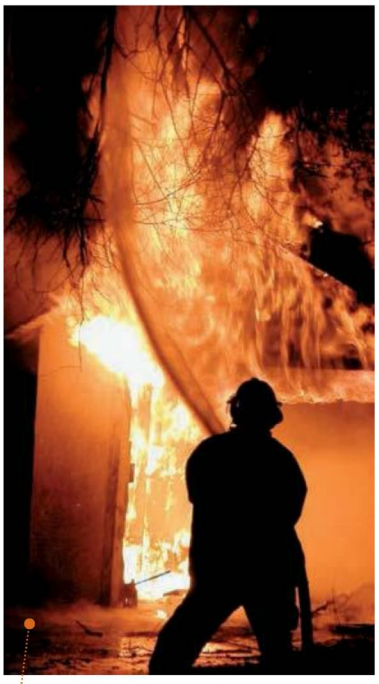
Spliced wires come apart.
The fix: Use the right-size wire connector. Line up the stripped wire ends so they are parallel; twist on the connector, turning it clockwise. Go the connector route; duct tape doesn't cut it.

2

The light fixture is shot because someone "overlamped" it with a higher-wattage bulb than it's rated for.(Are you *still* using incandescents?) This overheats the fixture, its wiring and the splices that connect it to the house wiring.
The fix: Replace the fried fixture, and install a bulb with the proper wattage.

3

A loose connection lurks at a switch or an outlet.
The fix: Turn off the power, remove the wire from the device and cut away damage. Strip insulation and wrap the bare wire clockwise around the screw, then tighten firmly.



Worst-case scenario. Moral: don't take chances with electricity. If a plug looks dodgy, replace it.

"My wife and I live in a home whose original construction dates to 1790, and I can't help imagining what's gone on there over the years. In cool weather, groaning and squeaking sounds emanate from the southwest corner of the house. The noises originate roughly from the area of the hot water cylinder, so I'm sure there's a mechanical explanation. But the sounds change pitch and cadence like a human voice, so it's unnerving. The house is talking!" – *Joe Bargmann, PM special projects editor*

SPOOKY, SELF-ANIMATING DOORS

They slam shut on their own!

Possibility

The ghost of Aunt Mary, the one who hated draughts and always wore a jumper and heavy scarf around the house, is letting her feelings be known.

More likely

The door is hung out of plumb and fits so loosely in the jamb that the strike easily slips out of the latch plate; gravity, not Aunt Mary's ghost, swings the door shut or open.

A steady wind could also be to blame; it creates low pressure on the downwind side of the house, causing air to flow out. Any open door on this side of the house could swing shut due to the air-pressure differential. The problem may be amplified by an open garage door on the downwind side. Intense low-pressure vortices form around the door opening.

The fix

A couple of hammer taps can put just enough bend in the hinge pin to increase friction and stop the door from swinging freely. Closing the garage on a breezy day can help, as can sealing air leaks with weather-stripping.

A low-pressure zone on the downwind side of the house can create enough suction to cause an interior door to slam.

"My parents' house has mysterious and often inaccessible old places no longer needed in this life, where you imagine something still exists: an awkward attic, a dark area under the front porch where a toad or two lives comfortably in the summer... There's also a cupboard door that has been stuck shut for decades. Once, in the bathroom someone happened to look up at a light fixture and saw something moving. It turned out to be a snake." – *Robin Tribble, PM copy chief*

THEY'RE HEEERE!

But who are they? Phantoms, ghouls or spooks in the attic? Or maybe mice, bats or rats? (Scary either way, right?)

Sound: Scratching and scurrying at night.
Source: Mice or rats.
The fix: Place snap traps perpendicular to the wall, not parallel to it. Clear brush and shrubs next to the house. Clean the garage and keep all rubbish bins closed. Store pet food and birdseed in tightly sealed, gnaw-proof containers. Remove or bury dog waste.

Sound: Squeaking, twittering and fluttering at dusk or at night, and again at or just before dawn.
Source: Bats
The fix: Consult a pest-removal professional to clean up bat droppings, and place one-way bat-exclusion devices. Once bats leave, they cannot re-enter. Close up openings in the eaves; screen off vents.

Sound: Scurrying during the day, usually in the roof space.
Source: Squirrels
The fix: Removal by an animal-control company. Look for large, gnawed entry holes and repair them. Use heavy screens on roof space vents. Trim tree branches to prevent entry from the roof and eaves.

MYSTERIOUS HOLES IN THE GROUND

Tiny tunnel openings appear in your yard – and there's no sign of animal activity.

Possibility: Those holes are portals to the underworld, don't you know? Mischievous excavators use them to come and go when you're not paying attention.
More likely: You've got a collapsed foundation drain, or the concrete inspection cover on the septic tank has deteriorated and caved in. You may also have a sunken leachfield pipe (known as a galley).
The fix: To find a damaged drain, dig next to your house. Once you uncover the damaged drain, you can repair it. Yes, it's a big job. If you find larger damage, you'll need to hire an excavation contractor. Investigating larger collapsed underground structures, such as septic tanks, is best left to the pros.

SQUEAKY-FLOOR FIXERS

DEAD TREES TALKING

Your house sounds like a horror movie. You can't go anywhere without a creaking noise emanating from a floor.

Possibility: The trees that became your house's floor have come back to haunt you, seeking revenge for the chainsaw massacre that felled them. (And if you think trees can't be scary, try watching *The Wizard of Oz*.)
More likely: Hardwood and carpeted floors squeak when the subfloor below flexes down against the floor joist, or the floorboards rub together.
The fix: The Squeeeeek No More kit (above) fastens the loose subfloor to the joist (you can buy it through Amazon for about R160, or try a better class of hardware store). Its floor fixture **(A)** positions and snaps off screws driven through hardwood floors. The screws **(B)** have a square drivehead and a scored shank to help them break off cleanly below the floor's surface. The alignment tool **(C)** assists in driving screws into carpeted floors; a notch in its side helps you grab the screw head and cleanly snap it and part of the shank below the surface of the subfloor. The special drive bit **(D)** has a stop collar formed in its shank; it's used with both the hardwood-floor fixture and the alignment tool for carpeted floors. Two square-drive joist-finding bits **(E)** are included with every kit. Drive one at each end of a joist to form a sightline to help you keep the screws on track as you work down the length of the joist.

Alternatively, sprinkle talcum powder along the gaps between the floorboards and hope for the best.

ATTACK OF THE EVIL HEAD SLAMMER

Toilets flush by themselves, and there's this awful hammering sound when you use a tap or the washing machine.

Possibility: A prankster elf makes its way through that loose basement window you've been meaning to fix, slams the toilet lever, then slips out, but only after banging its head on a cold-water pipe.
More likely: The mystery flush is caused by a worn-out flapper valve that allows water to trickle out of the toilet tank. Eventually, this trips the fill mechanism. The banging results from water slamming into a closed tap. It also happens when flowing water is stopped by a solenoid valve in a washing machine or dishwasher. The sound reverberates through wall and ceiling cavities.
The fix: To correct the problem, replace the flapper. The pipe banging, known as water hammer, can be remedied by a cushioning device called a water hammer arrestor. For clothes washers, you can thread it on to the valve behind the appliance. In other cases, you have to cut the copper tubing and solder the arrestor into place.

PM

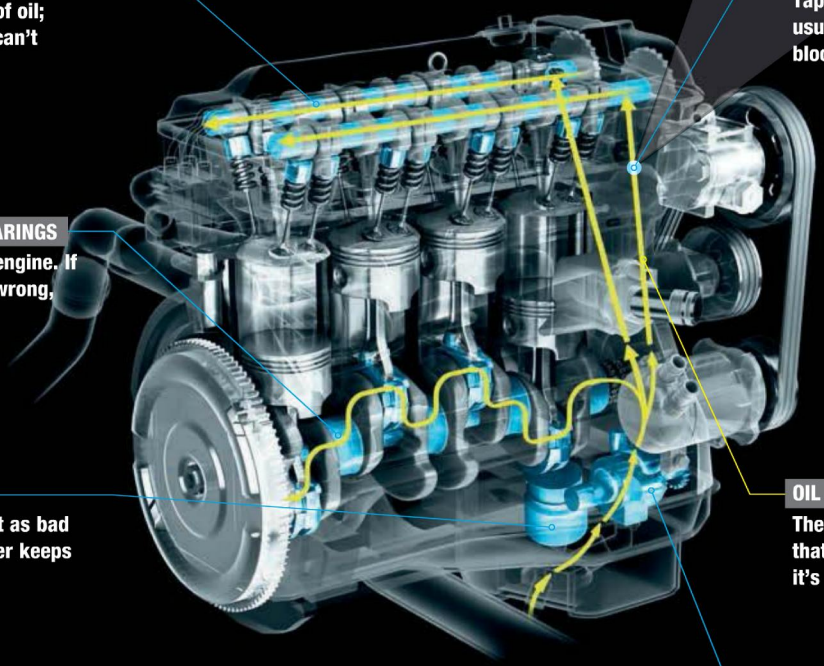
To swap a flapper valve, shut off water to the tank and flush. Drain the remaining water, unclip or cut off the old flapper, and replace.

The oil circuit

UNSEEN AND UNSEXY, IT IS THE VASCULAR SYSTEM OF THE ENGINE. POOR PERFORMANCE HERE WILL GRIND THE ENGINE TO A HALT.

CAMSHAFT AND HYDRAULIC LIFTERS
Camshafts operate the valves at high speeds and need plenty of oil; hydraulic lifters can't work without it .

OIL-PRESSURE SENSOR
Taps into the oil circuit, usually on the side of the block.



CRANKSHAFT BEARINGS
The spine of the engine. If something goes wrong, it's paralysed.

OIL FILTER
Dirty oil is almost as bad as no oil. The filter keeps it clean.

OIL GALLERY
The pressurised passage that delivers oil to where it's needed.

OIL PUMP
Pulls oil from the pan and delivers it to all of the engine's vitals.

Illustration by Michael Tschernjajew

OIL CRISIS

The oil light on my 12-year-old car comes on at low revs and then shuts off as I start driving. I checked the oil level and it's fine. Is this something I should be worried about?

Any time the oil light goes on, it's cause for concern. Many newer and high-feature cars have oil-life monitors that determine when the oil needs to be changed, but the glowing red oil light in your vehicle indicates the oil pressure is low. That's bad for several reasons. Low pressure means there either isn't enough oil in the system or the oil pump isn't circulating enough oil to keep the critical bearing and friction surfaces lubricated. If the light comes on while at speed, do your best to pull off the road quickly, turn the engine off, and investigate the problem to avoid damage.

Oil is the lifeblood of any engine, but the oil circuit is probably the least appreciated engine system. The oil-supply path starts in the oil sump, where

a pump sucks up the lubricating fluid and distributes it to passages cast into the block. From there oil is directed to the crankshaft bearings, the camshaft bearings, the valve shafts, and other important moving parts.

Modern oil formulations include detergents, so regular oil and filter changes at intervals recommended in the owner's manual generally keep the system happy. Unfortunately, everything wears over time, which increases the tiny gaps between sliding parts. Those alone can cause a slight drop in oil pressure, as can an ageing pump.

Before you go too far in diagnosing the problem, it probably makes sense to double-check the oil level and top it off to make sure that isn't the problem. Since the light comes on at low engine speeds and then shuts off, the oil pump is probably fine; if the pump were dying, you'd see low pressure at high engine speeds as well.

The most likely culprit is the sensor that operates the light. The sensor is screwed into the engine and has a probe that resides in an oil passage. It's basically an on/off switch that uses the oil pressure to close an electrical circuit. Sometimes a particle of dirt or some other foreign matter gets into the probe and fouls the part.

The sensor is fairly easy to replace – as long as you can get at it, which is sometimes difficult. Unhook the wiring, loosen with a spanner, and follow the instructions to replace the sensor. Take the car for a test drive and see if the light still goes on at idle. If it does, you might be due for a new oil pump after all.

NEAR CORRECTION

Q Your response to a recent question ("Boiling Point", March 2012) is way out there. The question said that the car overheated, but turning on the a/c caused it to cool down. That's a classic problem. Turning on the a/c engaged the secondary cooling fan, which increased airflow. This means the main cooling fan wasn't working; the questioner should have checked the fuse and the wiring.

A This is a case of too little space in the magazine. Whenever a reader asks a question, it usually comes with loads of details, which we edit to fit into the allotted pages. In the original version of this question, the reader specifically stated that the main cooling fans were working fine, so I focused on the other possibilities. In retrospect I should have noted the fans still worked and maybe mentioned that the thermostat switch that controls the fans should be inspected as well. In the future I'll make sure to include all the relevant details for every question. Thanks to all the many (many!) readers who sent letters correcting me on this – it's good to know you're paying close attention.

MYSTERY LEAK

Q I just got new tyres a few months ago, but since then one of them has been going flat regularly. I had that one checked out where I bought the tyres, and there aren't any holes in it, so I'm perplexed. How does a tyre with no leaks go flat?

A This sounds like a riddle: How can a tyre with no holes go flat? By not leaking through the tyre, of course. Just because the tyre itself is fine doesn't mean there aren't other avenues for air to escape.

Two prominent possibilities are the valve stem and the wheel on which the tyre is mounted. Usually, a new set of tyres includes new valve stems, since they can go bad through use and from exposure to road chemicals. If a valve is bad, you'll have a constant and very slow leak through the base or the valve body.

The other possibility is that the mounting surface of the wheel where the bead of the tyre seats has become damaged by corrosion or dented from hitting a pothole. To see where the problem is coming from, fully inflate the tyre and dribble a mixture of dishwashing liquid and water onto the valve stem, around its base, and around the inside and outside edge of the wheel where the tyre and rim meet. Any escaping air will produce bubbles in the soapy water at the site of the leak. Then you can take the tyre to the workshop where you purchased it (which is where this leak should have been diagnosed in the first place), knowing exactly what and where the problem is.

LOCKED OUT

Q I have an older work pick-up, and although it still runs and drives well, I've noticed the key lock tumbler on the driver's side door is starting to get finicky. When I put the key in, I have to jiggle it around before the tumblers will turn in the lock. Is there a way to fix this without too much trouble?

A Doors and door parts – especially on the driver's side – get a huge amount of use and abuse. The advent of keyless entry has reduced the number of cycles a lock tumbler will experience, but manual locks get the what-for every time you enter the vehicle.

The first thing you might try is spraying some graphite lube into the keyhole – if the mechanism is just sticking, this could be an easy fix. If that doesn't do it, you'll need to replace the lock tumbler with a new one; this ranges from a very simple procedure in old trucks to a bit tricky in new and high-feature pick-ups.

The inexpensive option is to take the inner doors apart and swap the driver's side lock for the invariably less worn passenger-side tumbler. In all likelihood these are interchangeable parts and the passenger-side tumbler has another 300 000 kilometres' worth of use in it because it has gone through fewer cycles.

The more fancy-pants fix is to get a new lock mechanism from your dealer for the driver's side door, machined to match the original keys that came with the vehicle. Obviously, this is a bit more expensive than swapping old parts around. Considering how cheap I am, taking a few minutes to transfer those locks side to side is what I'd go for.

HEADLIGHTS DON'T NEED NO STINKING WASHERS

Q I have a 2000 Audi A4, and the headlight washers don't work. Is there a less expensive solution than having them fixed by the dealer?

A The short answer is no. Audi vehicles – and VW Group cars in general – aren't cheap to fix. I have a similar vintage A4 and my headlight squirters don't work either. It might be something simple and silly like a loose wire to the pump motor, so it's worth checking those connections. It could also be grime in the mechanism that lets the washers pop up out of the bumper. Could be clogged hoses, or a clogged filter at the bottom of the washer fluid bottle.

But if it's not any of those problems, I've got another suggestion: don't worry about it. At some point you have to draw the line between a convenience you want and a feature you need – powered headlight washers fall entirely within the "want" category. Let's be rational about it: if you factor what you'd spend to fix these washers into a cost-per-use ratio, I'd wager that you'd be spending quite a bit for every squirt of fluid to kind of clean the headlights. You're really better off just stopping at a filling station and using the squeegee to clean the lenses. This might be a rather unsatisfying answer, but sometimes frivolous features such as these should be left to die. **PM**

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

Autostyle MOTORSPORT

Autostyle Gauteng
83a Church Street, Mayfair, JHB, Gauteng
Tel: 011 661 1700
Fax: 011 837 3116

Autostyle Kwazulu-Natal
1-3 Jubilee Grove, Gateway Autocity
Umhlanga-Ridge, Kwazulu-Natal
Tel: 031 566 5099
Fax: 031 566 3473

Autostyle Online
Shop online at our award winning website: www.autostyle.co.za
Nationwide Delivery within 4 days :
Email: info@autostyle.co.za

WWW.AUTOSTYLE.CO.ZA

NATIONWIDE DELIVERY! OPEN 7 DAYS! WE BEAT ANY PRICE!

WE ACCEPT: VISA Maestro MasterCard VISA Electron RCS credit

Osram Silver Star Bulbs 50% Brighter, 20m More Distance. From R95set

Xenon HID Headlight Kits H1, H7, H3 & H4 from R495set

Led Flexible Stripes Blue/Red/White 44cm R80pair

Assorted DRL Style LED Headlights from R1750set

Official South African Agents for Lamin-X films 60x30cm assorted colors R250ea
Custom Sizes can be cut on request

Bodykits and Spoilers Available for most cars

Glassylite Headlight Kit Restore & Protect R195set

Cobra ESD-7100 Laser & Radar Detector - R750

Assorted Design Autogauge Performance Gauges
Boost Gauge from R180
Oil Pressure from R180
Oil Temp. from R180
Water Temp from R180
Fuel Pressure from R180
Air Fuel Ratio from R180
Voltmetre from R180
Tachometres, Shift lights and more available

Smyka Radio/Sd/USB/FM Media Player R295

Targa Mp3 CD Front Loader with USB & Front Auxillary R550

JVC KD-R326 Mp3 CD Front Loader with Front Auxillary input R550

Pioneer DEH-1450UB Front Loader with USB & Front Auxillary R795

JVC KD-XR416 Double Din Mp3 + USB R1595

Sony DSX-A30 Media Front Loader with USB Slot - R750

Evo-Tuning Amplifiers
2000w 4channel - R695
3000w 1channel - R995

Alpine PMX-F640 Amp 50rms x 4ch R1595

12" 1000w - R450
12" 1400w - R495
12" 1400w DVC - R550

Roofmount Screens
7" - R795
8.5" - R850
13" - R1295
12" - R1095
15.4" - R1695
17" - R2100
22" - R3300

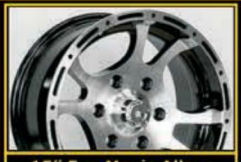
6x9" Speakers at unbeatable prices!
(Sold as a pair including speaker wiring & covers)
Audioblast 500w 3way R199set
ICE Power 500w 3way R199set
Evo Tuning 500w 3way R250set
Audiobank 400w 3way R295set
Pioneer 400w 3way R395set
Pioneer 500w 3way R450set
Pioneer 600w 5way R695set
Sony 300w way R395set
Boston Acoustics 400w R595set
JBL 210w 3way R550set

Evo Dino Alloy Wheels 4/100 & 4/108 pcd
13" R1495 | 15" R2495

Evo BBT 4/100, 5/100 & 4/108 pcd 13" R1795
15" R2495 | 17" R3995

17" Evo Nite Alloys 4/100 & 4/108 pcd R3500 set of 4

Evo Venomz Alloy Wheels 4/100
15" R2495 | 17" R3800


15" Evo Mavic Alloys 6x139 pcd R2695.00set

15" Evo Avalanch Alloys 6/139pcd R2895set

DUNLOP YOKOHAMA PIRELLI WANLI accelera KENDA EVO

WHEEL & TYRE FITMENT CENTRE OPEN SEVEN DAYS!
Opposite Autostyle JHB Store.
ALLOY WHEEL & TYRE FITTING, BALANCING, STRIPPING

ALL OUR ALLOY WHEELS ARE SUPPLIED "COMPLETE" INCLUDES BOLTS, NUTS, SPIGOTS, CENTER CAPS , VALVES AND VALVE CAPS

13 & 14" TYRES

155/70/13" - Pirelli - R400
165/80/13" - Pirelli - R420
175/50/13" - Yokohama - R795
175/70/13" - Kenda - R390
175/70/13" - Pirelli - R440

175/65/14" - Accelera - R420
175/65/14" - Pirelli - R460
175/70/14" - Kenda - R480
175/70/14" - Pirelli - R570
185/60/14" - Pirelli - R530
185/65/14" - Dunlop - R520
185/65/14" - Pirelli - R550

15 & 16" TYRES

185/65/15" - Dunlop - R580
195/50/15" - Wanli - R480
195/50/15" - Dunlop - R520
195/50/15" - Pirelli - R620
195/50/15" - Yokohama - R550
195/55/15" - Rockstone - R495
195/65/15" - Dunlop - R580
205/60/15" - Dunlop - R620

195/45/16" - Sunny - R570
205/55/16" - Pirelli - R780
205/55/16" - Rockstone - R630
225/55/16" - Accelera - R995

17" & 18" TYRES

205/40/17" - Pirelli - R740
205/40/17" - Sonar - R580
205/40/17" - Yokohama - R795
215/45/17" - Kenda - R750
225/45/17" - Dunlop - R795
225/45/17" - Yokohama - R995
235/40/17" - Dunlop - R895
235/45/17" - Rockstone - R795

225/40/18" - Wanli - R895
225/40/18" - Yokohama - R1200
235/40/18" - Regal - R950
255/35/18" - Sonar - R1295

4x4 & 20" TYRES

225/35/19" - Yokohama - R1495
235/35/19" - Sunny - R1200
235/35/19" - Yokohama - R1495
265/30/19" - Accelera - R1900

Bakkie and 4x4/SUV Tyres
195R15" - Dunlop - R895
215/R15" - Dunlop - R950
30X9.5 15" - Yokohama - R1295
265/70/16" - Sonar - R1750
275/40/20" - Sunny - R1450
275/45/20" - Wanli - R1600
315/35/20" - Pirelli - R3995

E&OE All prices are Vat inclusive. Prices are valid at time of print . ©All images & logos are copyright property of Autostyle Motorsport & their respective suppliers

BUYER'S GUIDE

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

GENERATE INCOME!

Coin/Token/Card based **Utility Timer**

Completely configurable timer – ideal for managing and charging for pay-per-use utilities such as:

- SPORT COURT LIGHTS
- SUN BEDS
- GAME CONSOLES
- PARKING LOTS
- LAUNDRY MACHINES
- CAR WASH
- ...AND MANY MORE

FROM ONLY **R3200**

Another innovation by BSI BLUE SADDLE INNOVATIONS

FOR SALES ENQUIRIES
082 390 7390
www.bsinnovations.co.za

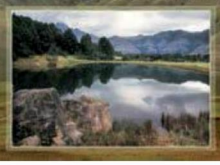
Sense of Place!

CHAMPAGNE CASTLE HOTEL IS AN EXTRAORDINARY DESTINATION AT THE FOOTHILLS OF THE CENTRAL DRAKENSBERG IN KWAZULU NATAL

- World Heritage Site
- Wellness & Spar
- Luxury Rooms & Chalets
- Fishing, Hiking, Horse riding
- Alpine Majesty

CHAMPAGNE CASTLE HOTEL ★★★★

CONTACT US
TEL: +27 (036) 468 1063 FAX: +27 (036) 468 1306
EMAIL: INFO@CHAMPAGNECASTLEHOTEL.CO.ZA
WEBSITE: WWW.CHAMPAGNECASTLE.CO.ZA



Value begins with VEE

VEEMOTORS

Workshop & Service Centre
Clutch & Turbo Replacements
General Repairs & Servicing
VW & Audi Engines

YOUR OUT-OF-WARRANTY
VW & AUDI SPECIALISTS

Tel: (011) 615-6110
www.veemotors.co.za
sales@veemotors.co.za

FOR A DISTRIBUTOR NEAR YOU CALL GARRY LUMPE IMPORTS 011 425-4265

KNIPEX Quality-
Made in Germany
www.knipex.de

Premium Tools for Professionals
www.wiha.com

wiha Premium Tools

GERMAN MANUFACTURED QUALITY HANDTOOLS

If your car is out of warranty or the motor plan has expired then service, repair or tune it at SAC

- ROUTINE SERVICING
- MAINTENANCE & REPAIRS
- PERFORMANCE ENHANCEMENT
- ENGINE REBUILDING

SAC Bloemfontein	SAC Boksburg	SAC Cape Town	SAC Centurion	SAC Durban
051 448 7909	011 823 3676/7	021 552 1003	012 621 9060	031 569 6734/5/6
SAC Midrand	**SAC Nelspruit**	**SAC Port Elizabeth**	**SAC Vanderbijlpark**	**SAC Trucks**
011 466 2050	013 753 3750	041 372 2301	016 933 9972	0860 88 55 88

Harley Davidson Workshop NOW open in Vanderbijlpark! - Tel: 016 981 8500

Power means nothing without Reliability

SAC Steves Auto Clinic

Just Follow the Leaders!
www.steves.co.za

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

little luxury

QUALITY FILTERS & WATER COOLERS
LUXPURE DIGITAL WATER FILTER
WITH NEW, ADVANCED & PATENTED
SILVER IMPREGNATED MICROTECH™ FILTER

Little Luxury Original Filter Cartridge
R279.99
Silver Impregnated Microtech™ filter
SAVE 1000'S OF RANDS ON BOTTLED WATER!
R399.99
3 STAGE FILTER IN 1
GUARANTEE 5 YEAR

Electronic meter shows when the filter needs to be replaced
Removes organic & inorganic micro particles & selected spectrum bacteria
Removes heavy metals, including lead and 99% chlorine*
Removes 99.7% E. coli in normal city or municipal tap water
No Plumber Needed

Available at:
Dis-Chem PHARMACIES
Pharmacists who care
Pick n Pay HYPER Inspired by you
Checkers Hyper
Also available at all major retail stores
0027 (0) 11 784 4444
Email: info@littleluxury.co.za www.littleluxury.co.za

JAPAN AUTO
Engines and Gearbox Importers
Jetpark:
011 397 6789 0861 Engine (364463) 08611 JAPAN (52726)
Authorised Dealers:
Empangeni: 0861 25 27 26 Bloemfontein: 051 448 4171
www.japanauto.co.za sales@japanauto.co.za

ENGINE'S - PETROL, DIESEL, TURBO CHARGED & SELECTED NEW MOTORS
Toyota 2Y 3Y 4Y | Alfa AR67024 | Opel Z16SE | Volvo B4184s | BMW 3063D3

COMMERCIAL TYRES, CYLINDER HEADS, NEW TURBOS & ENGINE ATTACHMENTS
Alternator | Cylinder Head Mitsubishi 2.8L | Toyota 4Age Bellhosing | Distributor | 195R15 King Tyre

GEARBOXES - AUTO, MANUAL, 2WD & 4WD APPLICATIONS AVAILABLE
Ford Durec | Izuzu 4JA1 (2.5) | Toyota Hilux Prado and D4D | Toyota Dyna new 5spd

PERFORMANCE: TURBO'S, INTERCOOLERS, EFI, BOV'S, WASTEGATE & MORE
Starters New/Used | KKK Turbo | Management Systems | Auto Gauges

Source Generator XR2500
Source SH 2900DX

ENGINES • GEARBOXES • PERFORMANCE
PIRELLI KINGS TIRE PRECISION

VAN ACHT
Wooden Windows & Doors

Kya Sand: 087 151 3555 / 011 708 2488
Hartbeespoort dam: 012 244 1319
Pretoria/Montana: 012 548 7672
Klerksdorp: 018 462 0784
Krugersdorp: 011 644 7192

Frameless Folding Doors

www.vanacht.co.za

BUYER'S GUIDE

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

European Design

Superior Quality

- easy to learn (within 10 minutes)
- 5 x more effective than jogging
- stress killer
- calorie burner
- cellulite killer
- natural skin tightening
- for kids and adults up to 120kg

NEW!

7 League Boots
get fit fast and effectively

www.7league.co.za

Contact: Steff : 082 828 7421
Dealers wanted. Enquire now.

Get some for your kids, your partner and yourself NOW

- 98% of the muscles are activated
- strengthens back, abdomen and knees - approved by specialists in sport medicine
- endorphins after only 3 minutes
- take up to 2.7 meters strides
- run up to 32 km/h
- jump 1-1,5 meters off the ground

GutterStuff® Pro
The Professional Foam Filter Insert

DO YOU HARVEST YOUR RAIN WATER?
DO YOU HAVE PROBLEMS WITH BLOCKED GUTTERS?

Gutter Stuff®
is a foam insert that protects the gutter, not allowing any leaves, dirt, sticks or insects to block gutters!

Gutter Stuff®
- The easiest & most effective gutter filter on the market.
- The ONLY gutter filter with a patented design.
- Installs in minutes, no special tools required.

To see Gutter Stuff® in action search for "gutterstuff" on www.youtube.com

For more information call Gutterstuff on +27 76 470 4447

Handheld Scopemeters

For anyone interested in electronics (amateurs & pro's)

► **Why our Scopemeters:** Portable, Mains or Battery (6h), Isolated inputs, USB interface, store to Flashdisk

► ***Oscilloscope:*** Conventional & PC-based modes, 23 Signal measurements, Spectrum Analyser, 60~200MHz

► ***Multimeter:*** Voltage, Current, Resistance, Continuity, Capacitance, Diode

► DSO1060 & DSO1200

K Measure
Measurement for the Masses
www.kmeasure.co.za 012-333-5105

TIRE WATCH | MOTOR CYCLE TYRE PRESSURE MONITOR

BENEFITS

SAFETY
Avoid possible accidents due to an underinflated tyre

ECONOMY
Better fuel economy and tyre life

PERFORMANCE
Ensure maximum traction and best handling

PEACE OF MIND
From knowing that your tyres are inflated correctly

FEATURES

INTERNAL SENSORS
Constantly monitors the pressure and temperature of each tyre and updates it every 60 seconds

COMPACT & STYLISH DISPLAY
• Easy to read • Switches off automatically • Easy to remove • Back light for night driving

DISPLAYS
• The pressure or temperature of both tyres simultaneously • Outside temperature • Time

WARNINGS
• Pressure loss • Over temperature • Road ice conditions

QUICK TO RESPOND
• Active within 100m from pulling away

SIMPLIFY INFLATION
• 90 Degree valves are supplied in each kit

EASY TO INSTALL & SET UP
• No wiring required • One kit fits both 8.5 & 11 mm valves
• Can be retro fitted to most bikes

BesTech Since 1983 A selection of the world's finest accessories

Tel: +27(0) 12 665 0131/2 www.bestech.co.za

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

GPS TRACKING
AND DATA LOGGING AND REMOTE CONTROL SERVICES
FOR THE REST OF US

locat provides an afforable monthly pre-paid online **GPS tracking service** and supports a wide range of different GPS tracking devices, from miniature, personal units to vehicle-mounted equipment. Subscribers enjoy many of the same benefits as offered by the more costly services (including SMS alerts, geo-fencing and historic data download), and may share the GPS tracks with friends, family, colleagues and clients.

In addition to GPS tracking, **locat** also provides **data logging** and **remote control** services. Please visit our website at locat.co.za for more information about the device support and additional benefits and services available to our subscribers.

FEATURED VENDOR
COMMUNICA
PRETORIA • 012 657 3500
MIDRAND • 012 328 7008
CAPE TOWN • 021 447 0959
WEB • www.communica.co.za

2 x TK102-2 Personal Trackers + 1 x TK103-2 Vehicle Tracker — R3955
1 x TK102-2 Personal Tracker + 2 x TK103-2 Vehicle Trackers — R3955
3 x TK103-2 Vehicle Trackers — R3900
Prices and availability of stock determined by vendor

Track 3 GPS units for
R65
per month for the first 3 months
R99
per month thereafter
R35
per month per additional unit
Services are provided on a monthly, pre-paid basis.
Optional services are available at additional costs.
Bulk discounts negotiable.

locat is an independent entity, South African owned and operated. We work to please customers, not sharholders.

locat.co.za

BFB
BITS FROM BYTES
Affordable 3-D Printers powered by
3DSYSTEMS
The worldwide Leaders in Additive Manufacturing

Get ready for the revolution in 3D Printing.
The Brand New 3DTouch has a maximum build area of 275 x 275 x 210mm and a layer resolution of only 0.1mm. Materials include super strong ABS material in a variety of colours, solid and translucent, PLA, HDPE, LDPE, uPVC and PP. Features a all new tablet like touch screen user interface
The perfect 3D Printer for Education, Hobbyists, Enthusiasts and Professionals alike.
Create with Confidence

CAD HOUSE
137 Mopani Road
Hennopspark, Centurion
Tel: +27 (0)12 654 0559
Cell: +27 (0)82 561 5051
E-Mail: info@3d-printer.co.za
Web: www.3d-printer.co.za
3DSYSTEMS AUTHORIZED RESELLER

BUYER'S GUIDE

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

NEW IN SOUTH AFRICA
NOW COMES WITH INTERNET
FROM ONLY R4999
TOYOTA HILUX / FORTUNER

CUSTOM-MADE DVD/GPS COMBO RADIO REPLACEMENT
THESE UNITS ARE AVAILABLE FOR
& UNIVERSAL COMPATIBLE WITH VARIOUS MAKES
TOYOTA HILUX / FORTUNER

BMW E90

BMW E39 & BMW X5

AUDI A4

FOR AUDI A3

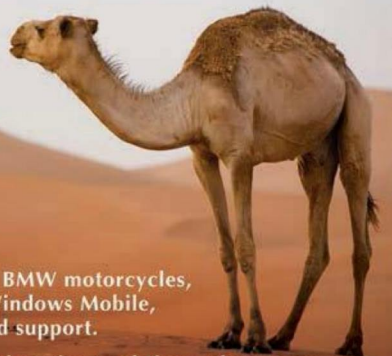
VW TOUAREG

FORD FOCUS / FIESTA

MERCEDES C CLASS

STANDARD FEATURES INCLUDE:
* CD/ DVD * MP3 * TV * IPOD * RADIO *
* BLUETOOTH * USB / SD CARD * V-CDC *
* NAVIGATION * AUDIO / VIDEO *
BUY NOW AND GET: FREE INSTALLATION, ONE YEAR WARRANTY & FREE SHIPPING WITHIN SA
XENON/HID LIGHTS
INCLUDES FREE INSTALLATION AND ONE YEAR WARRANTY
FROM ONLY NEW LOW PRICE
R1299
COMPATIBLE WITH ALL THE LATEST MODELS
CONVERSION KITS AVAILABLE FOR ALL CARS & BIKES
TEL: 011 609 6178
WWW.CARDVDGPS.CO.ZA
INFO@CARDVDGPS.CO.ZA
97 VAN RIEBEECK AVE, EDENVALE

GS-911
Diagnostic Tool

85 grams
for peace of mind
... or hope Hazziz doesn't miss his camel.

A diagnostic tool for BMW motorcycles, with Windows PC, Windows Mobile, BlackBerry & Android support.
Read & clear fault codes, view real-time values (sensors & outputs), reset service reminders, etc. This is the ideal tool that should be in everyone's toolkit, for expeditions, enthusiasts & mechanics alike.
Phone: 021 880 1433 | Online shop: shop.hexdiagnostics.co.za

Remote Instrumentation
Internet Database
Event Logs
Periodic status
ERROR notifications
Remote Control
Contact us now:
021 9817062
info@gsmcommander.com
4-20mA
0-30V
Total Control.
Peace of mind.
Developed, Manufactured and supported in SA
ICASA

BUYER'S GUIDE

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

Upgrade to an electronic ignition...

IGNITOR fits entirely inside the distributor -installs as quickly as changing a set of points! Add up to 20 horsepower

Fits 4,6 & V8 engines From R790 incl VAT 30 month warrantee

SAVE PETROL

IGNITOR

Never Change Points Again!

www.pertronix.com

CONTACT THE AUTHORISED SOUTHERN AFRICAN IMPORTERS

OFFSHORE MARINE INTERNATIONAL

Tel/Fax (021) 786 1007
Cell 082 491 8536
E-Mail: omiintl@mweb.co.za
P O BOX 43921 Fish Hoek 7974

CFP TECHNOLOGIES

Electric motors & Drives

Speed Control for your Machinery, Pumps, Conveyors, Fans, Mixers, etc

Variable Speed Drives for Electric Motors (VFD's or VSD's)
Single phase input, three phase output models. 0.18 Kw - 4 Kw
Three phase input, three phase output models. 0.18 Kw - 1000 Kw

Electric Motors
Single Phase: 0.12 Kw - 7.5 Kw **Three Phase:** 0.18 Kw - 330 Kw

Website: www.cfptech.co.za
Email: cjvdb@mweb.co.za
Tel: 082 8570324

BISHOPS auto spares

NEW & USED SPARES

FULL SERVICE & REPAIR CENTRE

AUDI VW SEAT

Tel: 011 591 1601

7B Terrace Rd, Eastleigh, Edenvale
www.bishopsautospares.co.za

Open Saturdays

WWW.THEGADGETSHOP.CO.ZA

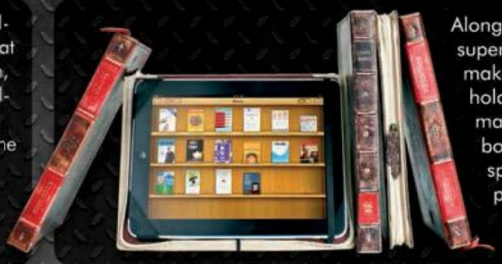
The GADGET Shop

PTA – Brooklyn Mall (012) 346-2726
JHB – Randridge Mall (011) 792-4912
CNT – Centurion Mall (012) 643-0967

X-TERRA 505 METAL DETECTOR

The X-TERRA 505 is the high performance mid-range detector. With advanced capability, great depth and excellent discrimination, the X-TERRA 505 is the ideal all-rounder to take your detecting experience to the next level. The X-TERRA 505 now has full frequency capability and can adapt easily to coin & treasure and relic hunting.

BOOKBOOK CASE



Along with its vintage looks, the super cool Genuine Leather case makes iPad feel as if you're holding a real book, and in many ways you are holding a book. The hardback cover and spine provide impact protection, while the hard protective inner frame offers crush protection.

Wireless Headset RS220

With its RS 220 wireless headphones, audio specialist Sennheiser is opening up a new class of wireless listening enjoyment. Due to their uncompressed transmission technology, the digital headphones combine high-end quality with absolute freedom of movement.

Power Monkey Extreme

The powermonkey extreme houses a massive 9000mAh capacity Lithium Polymer battery and offers users real power in a compact, durable shell. The unit is capable of recharging most 5V devices, including an iPhone up to 6 times, a Garmin Edge 800 up to 6 times and standard mobiles up to 12 times.

Cable Management

Cable Drops - gently grasps your power and peripheral cords so they do not fall off your desk every time you unplug your laptop.
Cable Clips - manages your cables in a simple and fun way by keeping cables accessible and organized. Perfect for stowing away all surplus cables.
Sumo - Sumo acts like a paperweight for your cables and features high-tech Japanese micro-suction pads underneath for further grip.

Magic Cube

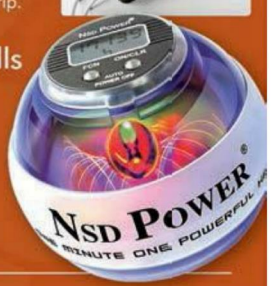
The cool new Magic Cube Virtual Laser Keyboard is a Bluetooth device that projects a laser-generated full-sized QWERTY keyboard onto any flat surface for iPads, iPhones, and Android devices. A handy gadget for travelers or anyone who prefers a full-sized keyboard rather than the tiny touchscreen on their smartphone or tablet.

Ion Slides to PC Express

SLIDES 2 PC EXPRESS makes it easy and fun to rediscover your 35mm film negatives and slides on your computer. If you're like one of the millions of people who have boxes of slide in little yellow boxes in the kitchen, this is perfect for you!

NSD Power Balls

Originally designed to improve wrist strength through its gyroscopic forces, the NSD Power Ball is actually a fiendishly addictive, one-more-go competitive device.



Franchises Now Available!

Please note: Prices subject to change without notice. E & OE

BUYER'S GUIDE

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

AutoBlue

HANDS-FREE CAR KITS

BURY TECHNOLOGIES

GERMAN ENGINEERED EXCELLENCE

SAFETY
The driver's attention is not distracted

COMFORT
- User friendly
- Perfect voice reproduction

ECONOMY
Drive and talk without the risk of fines

MODELS

CC9060 Music
- Touch screen
- Automatic voice recognition
- iPod/iPhone connectivity
- Music connectivity
- Stylish compact removable screen
- Can connect 2 phones simultaneously

CC9045

With Steering Interface | With 3-KEY Switch

A selection of the world's finest automotive accessories

BesTech Since 1983

Tel: +27(0) 12 665 0131/2
www.bestech.co.za

Plug in systems

DIESEL TORQUE CHIPTUNING No.1

LIFETIME 100% WARRANTY

+20% Power

TOYOTA 3.0 D4D	120KW/343NM – 145KW/420NM
NISSAN NAVARA 4X4	128KW/403NM – 150KW/460NM
FORD / MAZDA 3.0	115KW/380NM – 140KW/460NM
ISUZU KB300 LX	96KW/294NM – 120KW/360NM
ISUZU KB300 D-TEQ	120KW/360NM – 140KW/420NM
TOYOTA PRADO D-4D	120KW/400NM – 145KW/470NM
VW AMAROK 2.0 BI-T	120KW/400NM – 140KW/455NM
MITSUBISHI TRITON 3.2 DI-D	118KW/343NM – 140KW/415NM
VW T5 2.0 TDI	75KW/250NM – 100KW/300NM
BMW 2.0D	135KW/380NM – 161KW/450NM
BMW 3.0D	180KW/540NM – 215KW/630NM
JEEP 2.8 CRD	130KW/460NM – 150KW/510NM
HYUNDAI H1 2.5 CRDI	120KW/392NM – 142KW/455NM
KIA SPORTAGE 2.0 CRDI	130KW/393NM – 150KW/450NM
LANDROVER DISCOVERY 4 3.0D	180KW/600NM – 205KW/650NM
MERCEDES 350CDI	165KW/510NM – 185KW/570NM
AUDI A4 1.8 TFSI	118KW/250NM – 140KW/300NM
VW GOLF VI 2.0 TSI GTI	155KW/280NM – 185KW/330NM
MERCEDES C200 CGI	135KW/270NM – 155KW/310NM
OPEL 1.6T OPC	141KW/230KW – 160KW/275NM
MINI COOPER S 1.6T	135KW/240NM – 152KW/285NM

- Easily Installed.
- German Quality.
- Lifetime Warranty.
- Transferable to your next vehicle.
- Also for Trucks, Tractors and Boats.
- 4 Maps in 1 product.
- Stage 1-2-3 and OBDII.
- Available through accredited dealers nationwide.

NEW

Pedal Box
Faster acceleration
Better Throttle response
Quicker 0-100
Plug n Play
Only
R2250

Power +Performance less Fuel!

Contact Us - 021 556 6463 | 082 379 6141 | 072 602 2667
info@dieseltorque.co.za or www.dieseltorque.co.za

MAKE SIGNAGE
Print T-Shirts, Mugs, Caps!

Make Signage, Sandblasting Vinyl Cutter
Incl. Software & Stand
360mm R5500 incl vat
630mm R8000 incl vat
1260mm R12500 incl vat

Cut Perspex, Make Rubber Stamps

Laser Engraver
400x400mm
Incl. Software
R45000 incl vat

Print T-Shirts Heat Press
T-Shirt Press
38x38cm R3500
40x60cm R5000

Combo Press
R8000 incl vat

print underwear, caps, bags.
Cap Press
R3000 incl vat

print plates.
Plate Press
R3000 incl vat

print mugs.
Mug Press
R3200 incl vat
Cone & Regular mugs R5500

print lighters pens
Pad Printer

Rotary Trimmer
1500mm
R4000

3M
Reflective Road Signs Cutter
R35000
460mm Electric Guilotine R15000

Guilotine 320mm
R2400 incl

Auto Pad Printer
R9500 incl vat

Laser Engraver
*600x900mm /60W
R90 000 Incl VAT
* 1200x900mm /80W
R110 000 Incl VAT
Full house laser with rotary attachment air assist & Software.
CUTS & ENGRAVE
paper, perspex, wood, leather, name badges, rubberstamps

INDUSTRIAL MACHINE BROKERS
COUNTRY-WIDE 24Hrs DELIVERY
www.vinylcutters.co.za
031 301 6230 * 0843048133

A NEW WINDOW TO
THE WORLD OF
Gaskets

- PREMIUM QUALITY (approved by C.A.E)
- COSWORTH TESTED (Burton Power U.K)
- REUSABLE with built in O-rings (no groove needed)
- ALUMINIUM/COPPER/ STAINLESS STEEL
- SEALING PRESSURE up to 7 times MORE
- COMPRESSION RATIO raised or lowered
- LARGE BORE SIZES
- TURBO/NITROUS/ALCOHOL
- CUSTOM BUILT

Contact: Redline Engineering 021 556 5764 or 072 1433 773
www.redline-engineering.com

BUYER'S GUIDE

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

CASKA®
Car Multimedia & Navi System

Get the most out of your car, get CASKA.

- 7" HD digital touch screen (800x480)
- Garmap navigation with latest mapping
- Full iPod functionality
- Built in handsfree Bluetooth
- Integrates with steering wheel controls
- Plays CD, VCD, DVD, MP3, MP4, Div-X, etc.
- RDS Radio with preset stations
- Built in music hard drive
- Optional: TPMS / PDC / Reverse Camera
- Vehicle Specific models available: Toyota, Nissan, Volkswagen, Mazda, Ford, Honda and many more!

SUPPORTED BY GARMAP GETS YOU THERE!

TRACKS4AFRICA Now available!

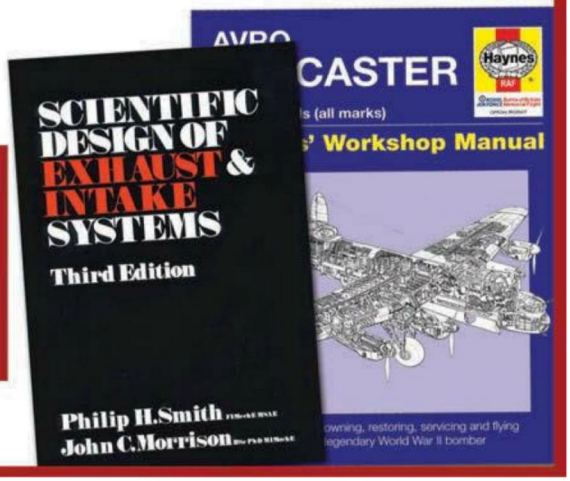
Distributed by PLANET ELECTRONICS Intelligent Accessories

0860 65 64 63
info@planetworld.co.za
www.planetworld.co.za

Motorbooks
the red planet
MODELS DVDs BOOKS ART WORKSHOP MANUALS

The Colony,
345 Jan Smuts Avenue,
Craighall, Johannesburg
www.motorbooks.co.za
Tel. 0861 113 947

IT'S A MAN'S WORLD



AV8 HELICOPTERS
LEARN TO FLY HELICOPTERS

TRAING HELICOPTER PILOTS SINCE 1999

Tel: (+27) 43.736.1660 Web: www.av8helicopters.co.za Email: info@av8helicopters.co.za
Location: East London Airport. RSA

THE MALL @ REDS / IRENE VILLAGE MALL
012-656 7901/2 012-662 1719/34

Foto and Hi-Fi World

SEXY BRANDS - HOT DEALS!!

BOWER Canon Nikon TIFFEN

www.fotohifiworld.co.za

BUYER'S GUIDE

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

If your car is out of warranty or the motor plan has expired then service, repair or tune it at SAC

- Low Pressure FreeFlow Exhausts and Branches
- Stage 2 Cylinder Head Conversions
- Uni-Chip Piggyback Computer Tuning
- U-Connect Plug in and Play Units for Turbo Diesels

SAC
Steves Auto Clinic
www.steves.co.za
Just Follow the Leaders!

Plug in systems

Powered by DTE
PETROL POWER CHIPTUNING No.1

LIFETIME 100% WARRANTY

+10% Power

TOYOTA 4.0 V6	175KW/376NM - 192KW/400NM
OPEL CORSA 1.4i	66KW/115NM - 73KW/125NM
GWM HOVER 2.4i	100KW/200NM - 112KW/218NM
DAIHATSU TERIOS 1.5i	77KW/140NM - 85KW/155NM
FORD RANGER 4.0 V6	154KW/323NM - 170KW/352NM
CHEV CAPTIVA 2.4	123KW/230NM - 137KW/251NM
TOYOTA HILUX 2.7 VVTi	118KW/241NM - 132KW/265NM
HYUNDAI Ix35	122KW/197NM - 136KW/217NM
VW POLO 1.6	77KW/153NM - 85KW/167NM
BMW 320	115KW/200NM - 128KW/218NM
MITSUBISHI OUTLANDER 2.4	125KW/226NM - 138KW/245NM
JEEP WRANGLER 3.8	146KW/315NM - 162KW/342NM
ISUZU KB240	94KW/207NM - 104KW/226NM
NISSAN NAVARA 4.0	198KW/385NM - 218KW/415NM
HONDA CRV 2.4	122KW/220NM - 135KW/241NM
MITSUBISHI TRITON 3.5	136KW/309NM - 150KW/338NM
AUDI A4 1.8 TFSI	118KW/250NM - 140KW/300NM
VW GOLF VI 2.0 TSI GTI	155KW/280NM - 185KW/330NM
MERCEDES C200 CGI	135KW/270NM - 155KW/310NM
OPEL 1.6T OPC	141KW/230KW - 160KW/275NM
MINI COOPER S 1.6T	135KW/240NM - 152KW/285NM

- Easily Installed.
- German Quality.
- Lifetime Warranty.
- Transferable to your next vehicle.
- Also for Trucks, Tractors and Boats.
- 4 Maps in 1 product.
- Stage 1-2-3 and OBDII.
- Available through accredited dealers nationwide.

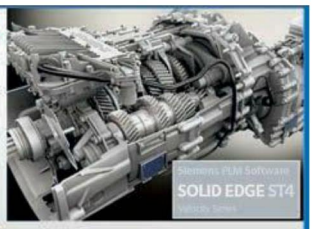
NEW
Pedal Box
Faster acceleration
Better Throttle response
Quicker 0-100
Plug n Play
Only R2250

Power +Performance less Fuel!

Contact Us - 021 556 6463 | 083 298 8544 | 082 379 6141
info@petrolpower.co.za or www.petrolpower.co.za

SOLID EDGE TECHNOLOGY
SET TO CONQUER

SIEMENS
SOLID EDGE
VELOCITY SERIES



- We specialise in the Sales, Support and Training of Solid Edge Software.
- Solid Edge is the most complete hybrid 2D/3D CAD system, that utilises Synchronous Technology for accelerated design.
- We offer Courses in Fundamentals, Synchronous, Assemblies, Sheet Metal as well as Surfacing. We pride ourselves in 20 years of Solid Edge Training and Experience.
- We offer a Consulting Service in Sheet Metal and Machine Design.

Contact Us

+27 11 742 1509
info@setech.co.za
www.setech.co.za

PRINT ON MOST HARD SURFACES !
including: Plastics, metals, wood, glass, crystal, ceramics etc.

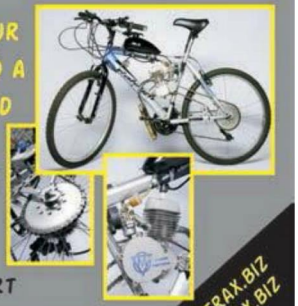
No precoated items or heat presses required.
Mugs printed with this system are DISHWASHER SAFE !
Systems from R 49,000 + VAT

www.jgelectronics.com
For every system sold we pay for the schooling of 1 under-priveledged child

sms cost R 2.50
sms MUGGIT PM + your email address to 40840 or email us for a free catalogue
Joburg - 011 789 6033 / Cape Town - 021 511 0134 / Bloem - 051-430-1554. Email: pm@jge.co.za

Ecotrax
BICYCLE ENGINE KIT

CONVERT YOUR BICYCLE INTO A RELIABLE AND ECONOMICAL MOTORCYCLE



- CLUTCH START
- 48CC 2 STROKE ENGINE
- 2LT/100KM FUEL ECONOMY
- 50KM/H TOP SPEED

INFO@ECOTRAX.BIZ
WWW.ECOTRAX.BIZ
082 376 1746

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

magswitch

Two MagJigs + One Universal Base = Hundreds Of Possibilities.
Introducing The Magswitch Workholding System.

A unique system that makes it incredibly easy to make a perfect cut every time. It's the only workholding solution you'll ever need because it fits every table. Thanks to remarkable new technology utilizing a magnet you can turn on and off. That means you can attach the Magswitch Universal Base to any woodworking table, anywhere you want it. And the two MagJigs go where no clamp can go - giving you total access and control with every cut.

Resaw Guide
Solid ball bearing support. Angled in/out feed to allow for blade drift adjustment.

Dual Roller Guide
Dual sets of ball bearings for extra firm support and control of tall panels.

Ultimate Thin Stock Jig
Three tools in one! Thin stock hold down and rip guide.

Vertical Featherboard Attachment with Risers
Adds vertical hold down or stack feature to Reversible Featherboard.

Universal Tracks 18" and 36"
Make your own jigs, fixtures, stops, fences and more! Accepts all standard mounting hardware.

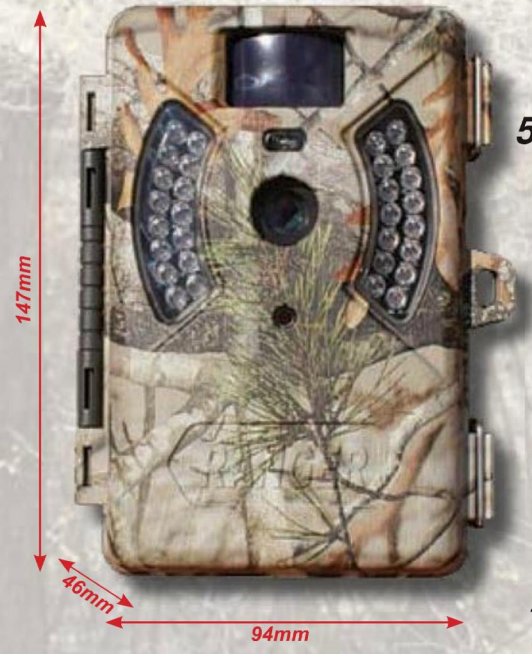
Reversible Featherboard
Reversible for cuts on right or left side of blade.

Compatible with the triton Work Centre
(also available exclusively from Vermont Sales)

www.magswitch.com.au

Vermont Sales
SOUTH AFRICA'S #1 SUPPLIER (Pty) Ltd
of power tool accessories
Powered by Service
For your nearest dealer call us on 011 314 7711
www.vermontsales.co.za

RANGER
Motion activated day/night camera



2 Megapixel
R1 500.00

5 Megapixel covert
R3 100.00

8 Megapixel HD
R3 500.00

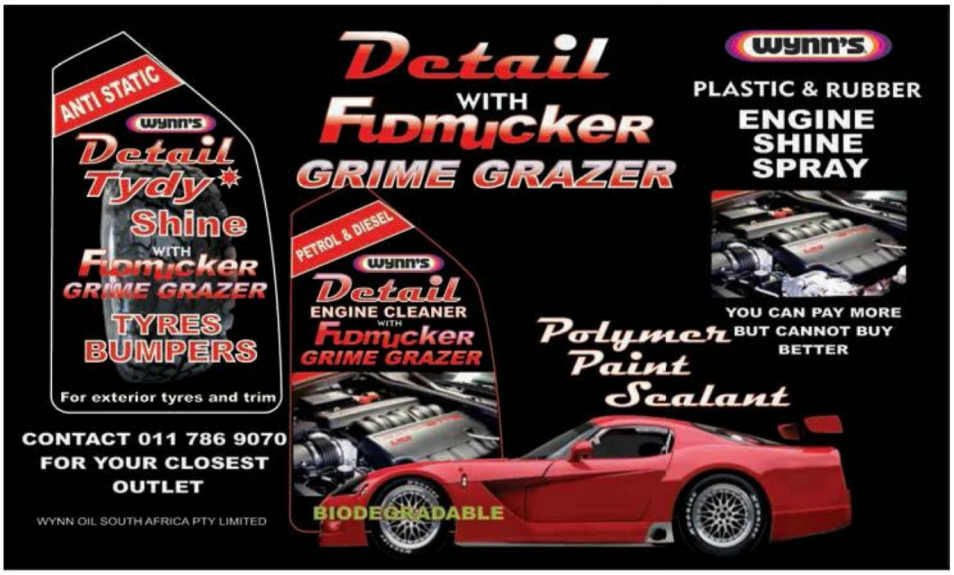
- Day or night *(invisible flash)*
- Photo / video
- TV output
- Tripod socket
- Up to 32GB memory
- Weatherproof

Also available in dark grey

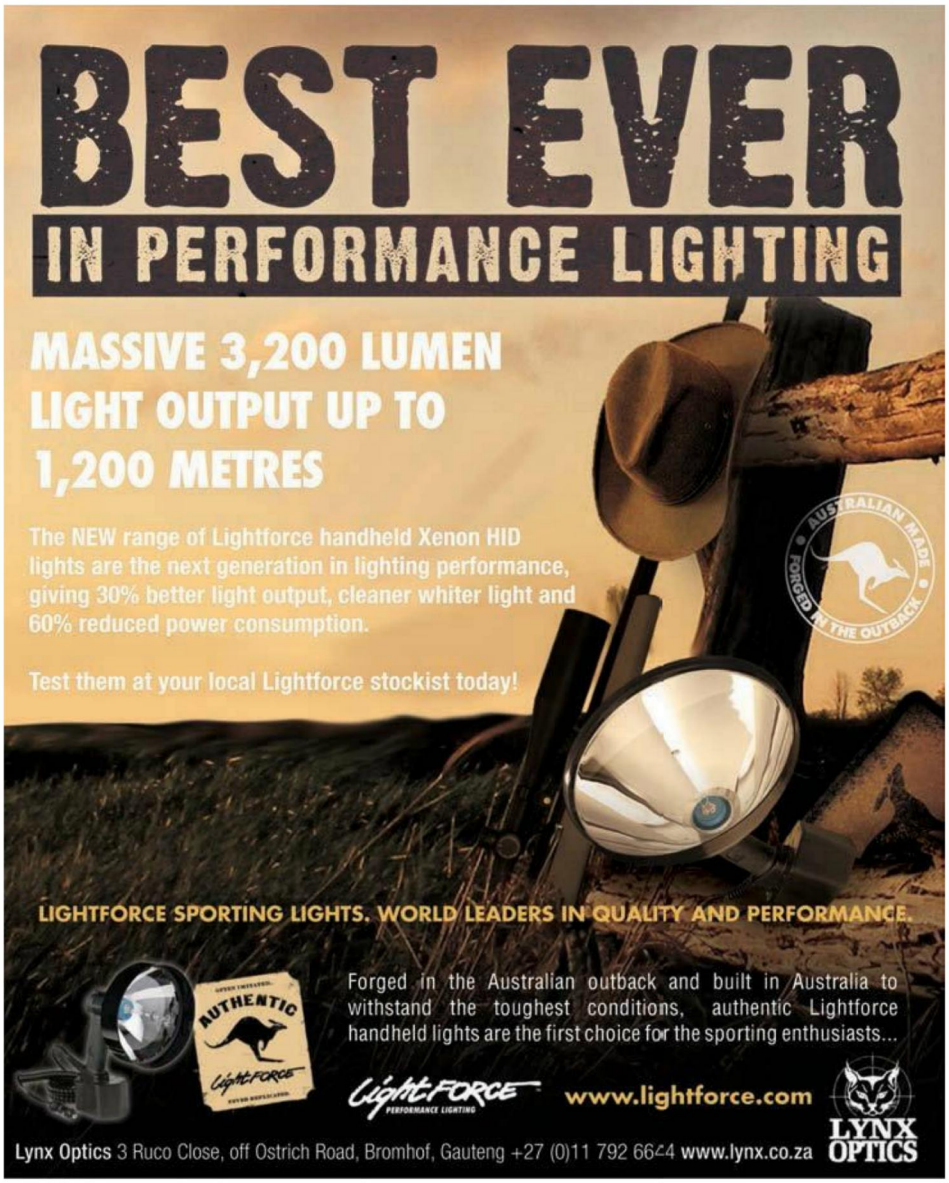
Ranger trail cameras automatically detect and photograph (or video) anything or anyone that intrudes the passive infrared (PIR) sensor coverage area.

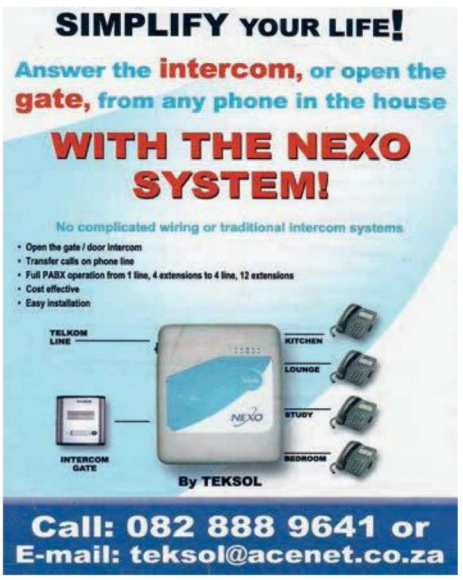
Rangers are compact and water resistant and may be mounted outdoors for long periods of time. A single set of 8 x AA batteries lasts for up to one year assuming 15 photos per day and 15 photos per night are taken.

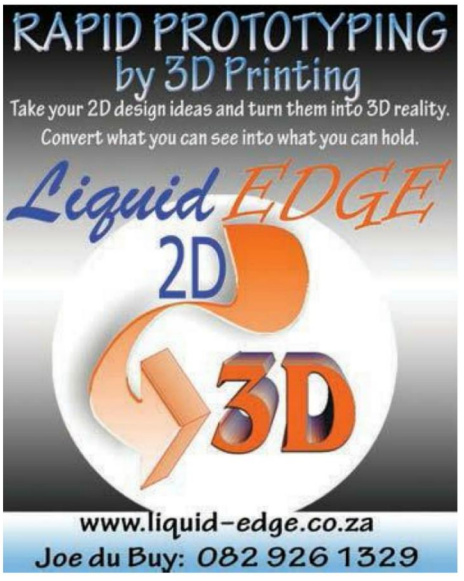
Contact us for details of a dealer in your area.
Distributed by Lynx Optics (Pty) Ltd.
Telephone: 011 792 6644, visit www.lynx.co.za



To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za





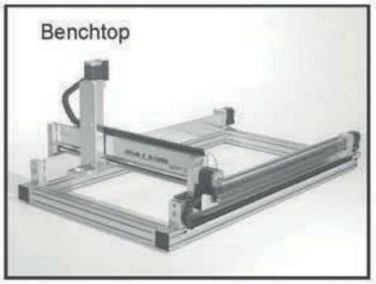


To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

CNC MILLING/ROUTING MACHINES

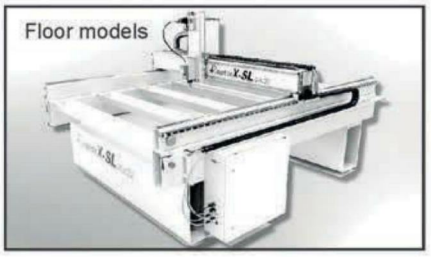
www.CNC-STEP.co.za

- Milling
- Routing
- Engraving
- Vinyl cutting
- PCB prototyping
- Circuit board drilling
- 2D and 3D work
- 4th axis 3D work
- 3D scanning
- Plasma Cutting
- Granite engraving
- Laser Scanning



HEIZ Models:
High Z-S Series Benchtop CNC Platforms
RaptorX SL Series Steel Frame Industrial
PlasCut 1350 CNC Plasma Cutting
RaptorX Plasma Cutting Systems
New: GranitoGrav Granite engraving System

Now Available:
Laser Probe 4200 3D Laser Scanner



Accuracy repeatable to 0.03mm, full 3D milling.
4th axis capability. Almost any materials can be cut or milled.
Affordable machines with unequaled accuracy and precision. Controller and software included. Easy programming
PLUG and PLAY, all models delivered ready to work

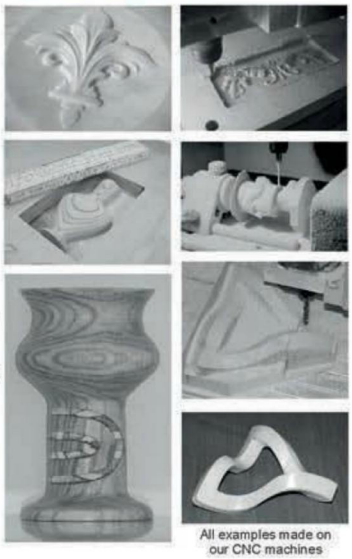
Now Available: Plasma cutting on any of our CNC platforms including the benchtop models.
We supply
Hypertherm Powermax 45
Hypertherm Powermax 65
Hypertherm Powermax 85

NEW: GranitoGrav

Engrave on Granite
Photo-Realistic engraving!
A photo, 300 x 230 mm, requires a processing time of about 40-50 minutes.
Pictures,150 x 100 mm, are ready in about 12-15 minutes on granite.

The innovation for all natural stone companies, Interior design, tombstones, monument design, memorials, etc. as well as glass or mirror engraving of finest quality.

Cutters last for 4 to 5 large pics. Cost about R20 per picture to engrave excl. granite. High profit work



All examples made on our CNC machines

GranitoGrav module can be mounted on our High Z-S Turbo series as well as the RaptorX series platforms

The CNC Platforms are easy to use. Non machinists will become pro's in a few days. Our software makes creating complex projects a breeze. For the not-so-arty folks there are thousands of designs ready to mill in 3D or engraving with a few mouse clicks. The same applies to the Plasma cutting platforms. You can make fantastic metal art work in minutes. A little practice and you will be a master craftsman in your workshop.

Excellent Prices, Call us NOW!

Agents: **CNC Instruments CC**
Contact: Mark 073 277 6582
or Matt 079 884 8453
Email: info@cncsolutions.co.za
info@cnc-step.co.za
www.cncsolutions.co.za
www.cnc-step.co.za

HEIZ CNC-Technik CNC Milling/Routing Machines **German Quality and Engineering**

STRONG MAN METAL WORK MACHINES

TURN METAL INTO MONEY

Prices range from R1 500 to R5 700 ex vat

Multi Bend System
Accurate, repeatable, smooth, wrinkle free bends! In solid bar and all types of tube.

- Tube and Bar Benders
- Scroll Benders
- Ring Rollers
- Bar & Onion Twisters
- Hole Punches
- Tube Notchers
- Brake Presses
- Hand Shears

Scroll benders
Enhance your products! Scroll up to 20mm sq tube /16mm solid bar.

4 Ton Ring Roller
Roll Rings, Coils & Arches! Roll to 50*10mm flat or 16mm sq or round bar and 32mm square or round tube.

Bar & Onion Twister
Make twisted bar/tube, onions and cables, up to 16mm.

Made in SA since 2004 – 24 month warrantee!

New Website > Lots more project ideas.
www.strongman.co.za

For more information.... ● SMS your email address to 083 609 7726 or email info@strongman.co.za ● Call Deon on 083 327 9988. ● Visit our Demo Centre

To advertise in Buyer's Guide contact Joanne, Lindi or Patrick on 011 783 7030 or email: popbuyersguide@ramsaymedia.co.za

CHAT. TRACK. ALERT

The latest in compact, portable communication technology.

PUSHTO TALK · PUSHTO IM_ · PUSHTO LOCATE · PUSHTO ALERT

- Two-way radio service via cellular network
- One to one, One to many or One to all Calls
- No ringing, waiting or dailling users
- Instant, reliable and affordable communication
- No fixed installations required
- Built-in Panic Button with GPS location
- Live GPS tracking of device/user
- Rugged IP54 PTT device, Loud Speaker, Long Battery life

Visit our webpage for you nearest agent:

www.instacom.co.za

instacom
INSTANT COMMUNICATION SOLUTIONS
exclusive Mobile Tornado partner

* terms and conditions apply

Manufacturers, Importers, Exporters & Traders Of Tents, Tarpaulins, Canvas, Safari Equipment, Beds, Mattresses, Tables, Chairs, Pots, Stoves, PVC Carports, Gazebo's, Workwear, Securitywear, Camping Equipment.

ARMY SURPLUS STORES
60 Mitchell Street, Pretoria West, Gauteng
Tel: (012) 327-3282/3/4/5 Fax: (012) 327-1194
Cell: 083 576 6099/082 8987961 E-mail: army@armystores.co.za
Website: www.armyco.net www.armystores.biz. WE BEAT ANY QUOTE!

Army Tents - Canvas & PVC 5M X 5M & 5M X 10M

Mosquito Nets - Single & Double

Sleeping Bags

New And Used Steel Trunks

Battles Jackets

Chow Kits

Army Water Bottles

Ammo Boxes Plastc + Steel Available

Army Beds - Single & Double

Cast Iron Stoves - 1, 2, 3 & 4 Plate

Dessert Boots

Budget Frame Tents: 3M X 3M - R1295 • 3M X 6M - R2100 • 4M X 8M - R2950 • 5M X 10M - R3900 • 7M X 12M - R4750

Kiddies Camo Overalls

Chopper Tents
2.1M X 2.1M - R2900
2.4M X 2.4M - R3900
3M X 3M - R4500

Knives, Water Bottles, Field Packs, Camp Suppliers And A Whole Lot Of Army Surplus.

Manufacturers, Importers, Exporters & Traders Of Tents, Tarpaulins, Canvas, Safari Equipment, Beds, Mattresses, Tables, Chairs, Pots, Stoves, PVC Carports, Gazebo's, Workwear, Securitywear, Camping Equipment.

WINNING TIP

TINY GARDEN, BRIGHT IDEA

About a year ago, my daughter moved into a small flat with a tiny courtyard that provided her only access to the outdoors. Intent on turning it into an attractive haven, we painted the walls in a nice shade of terracotta and screwed wooden battens to the top and bottom. Next, we installed ordinary chicken wire to form a matrix for a vertical garden, placed a few narrow containers and pots along the walls, and planted a variety of fast-growing creepers and flowers. A cast-iron patio table and chairs completed the project.

The results have been spectacular, and my daughter's courtyard garden draws a lot of praise from visitors. The granadilla has been especially successful, producing healthy fruit and threatening to take over the house! If you have a soulless courtyard at home, give it a try.

K LEVY
ORANJEZICHT

Have a ball

Do you have a blocked sink or bath drain and realised that you've lost the plunger? Here's what to do: grab an old tennis ball and cut it in half – you now have two "mini-plungers". Fill the blocked sink with a few centimetres of water, "prime" the half-tennis ball, place it over the drain hole and push down hard. For stubborn blockages, it may be necessary to repeat this action a few times. If necessary, you can use the other half of the ball to plug the overflow hole.

ROB NEWCOMB
SIMON'S TOWN

Put it away

This tip comes from an estate agent friend who has sold many houses. We've all heard about the importance of cleaning the house, making the kitchen and bathroom look attractive, and providing a "homely" smell via baked bread or scented candles, but many sellers overlook one of the more obvious factors that influence potential buyers: storage space.

We looked at this before putting our modestly proportioned and seriously cluttered house up for sale, and came up with a host of innovative solutions. We turned a broom cupboard into a mini-pantry, built shelves in the space above the entrance hall, bought a bunch of attractive boxes and other containers for loose stuff, and generally created a tidy home that looked almost minimalist. It sold to the first visitor.

MARIE EDWARDS
CENTURION

SEND US YOUR HINT – AND WIN

Send us your best home, garage, workshop and general DIY hints – and win! This month's best tip wins a Makita DF330DWLE 10,8 V Lithium-Ion Cordless Driver Drill worth R1 999. Weighing just 1 kg, the drill features an all-metal gearbox, 18 torque settings and a useful LED job light with an afterglow function. It comes in a plastic carry case, along with a battery charger (which revives the lithium-ion battery in about 50 minutes), a second battery, torch and holster. For more information, visit *www.makita.co.za* or contact Rutherford Johannesburg on 011-878 2600, Durban on 031-717 6400 or Cape Town on 021-932 0568.

Send your tips to: PM Do It Your Way, Box 180, Howard Place 7450, or e-mail: *popularmechanics@ramsaymedia.co.za* Please include your name, address and contact number. Regrettably, only South African residents are eligible for the prize. Prizes not claimed within 60 days will be forfeited.

Go on, be a man

If you've ever battled to unscrew a stubborn lid on a bottle or jar, you've probably tried all the usual solutions – running the lid under hot water, tapping it a few times with a hard object, wrapping the lid with rubber bands for a better grip, and so on. I've enjoyed a 100 per cent success rate by using latex washing-up gloves: they give you a tight grip and serious twisting power. If these don't work for you, you're a wimp.

J BRUINS
DURBANVILLE

Kitchen aid

I know you don't generally write about kitchen stuff in PM, but won't you please make a concession for my two hints? The first: if you want to thicken a soup or watery sauce without changing the flavour, add a few tablespoons of instant potato flakes. Second hint: this sounds weird, but the next time you make a grilled cheese sandwich, spread a generous layer of mayonnaise on the *outside* of the bread before placing it under the grill (don't forget to turn it once). The result is delicious!

MONICA EDWARDS
EAST LONDON **PM**

RESERVATION OF COPYRIGHT
The publishers of Popular Mechanics reserve all rights of reproduction or broadcasting of feature articles and factual data appearing in this journal under Section 12 (7) of the Copyright Act, 1978. Such reproduction or broadcasting may be authorised only by the publishers of Popular Mechanics. Published by RamsayMedia Pty Ltd for the Proprietors, Popular Mechanics (SA) Pty Ltd, Uitvlugt, Howard Drive, Pinelands, Western Cape. Distributed by RNA, 12 Nobel St, Industria West, Johannesburg, and printed Web offset litho by CTP Printers, Parow, Western Cape. Apple Mac support: Digicape tel 021 674-5000.

vodacom
WIN
a VIP experience at the
2012 Vodacom Origins of Golf
ORIGINS OF GOLF
vodacom
The Goose chase
Four VIP experiences are up for grabs in the 2012 Vodacom Origins of Golf, "The Goose Chase". Make sure you enter all four competitions to increase your chances of experiencing The Goose Chase at one of these great South African golf destinations.
6 - 8 June **Zebula Country Club** | 26 - 28 July **De Zalze Golf Estate**
22 - 24 August **Selborne Golf Estate** | 5 - 7 September **Sishen Golf Club**
The prize includes three nights accommodation with breakfast and dinner – and a full golf package of two rounds of golf including caddie/cart halfway, lunch and the legendary Origins goodie bag of TaylorMade golf gear. And if you happen to play well enough to finish top ten overall, you will automatically get a spot in the ***Fancourt*** *final from 26-28 September 2012!*
For De Zalze Golf Estate, SMS De Zalze + your name to 32697
For Selborne Golf Estate, SMS Selborne + your name to 32697
For Zebula Country Club, SMS Zebula + your name to 32697
For Sishen Golf Club, SMS Sishen + your name to 32697
Standard terms and conditions apply: no one from SAIL or RamsayMedia may enter. In addition, winners will be notified 24hrs after the closing date and need to inform RamsayMedia or SAIL if they are able to accept the prize and be at the event. Failure to confirm this within a further 48hrs will result in the prize being withdrawn and another winner being drawn. Winners require an official SAGA handicap and will be required to play off a maximum 18 handicap. The prize excludes transport to the event location. Winners agree to allow their image to be used in RamsayMedia magazines and websites. Winners will be notified two weeks before the event.
BlackBerry
The Goose FINE WINES
SUNSHINE TOUR
The Retief Goosen Charitable Foundation
TaylorMade
VOLVO
SAIL
Kathea

IRELAND/DAVENPORT 69770

Out of the Ordinary®

Investec

3 areas of expertise
3 decades of experience
1 out of the ordinary approach

Our can-do approach to Specialist Banking, Asset Management and Wealth & Investment enables us to turn challenges into opportunities. Bringing you a distinctive range of products and services in Private Banking, Capital Markets, Investment Banking and Property. Allowing us to deliver the unexpected.
www.investec.com

Specialist Banking | Asset Management | Wealth & Investment

Australia Botswana Canada Hong Kong India Ireland Mauritius Namibia South Africa Switzerland Taiwan United Kingdom & Channel Islands United States

Investec Limited and its subsidiaries, including Investec Bank Limited - 1969/004763/06, registered credit providers and authorised financial service providers. Cape Town 021 416 1000 Durban 031 575 4000 Johannesburg 011 286 7000 Pretoria 012 427 8300